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National Water Conditions

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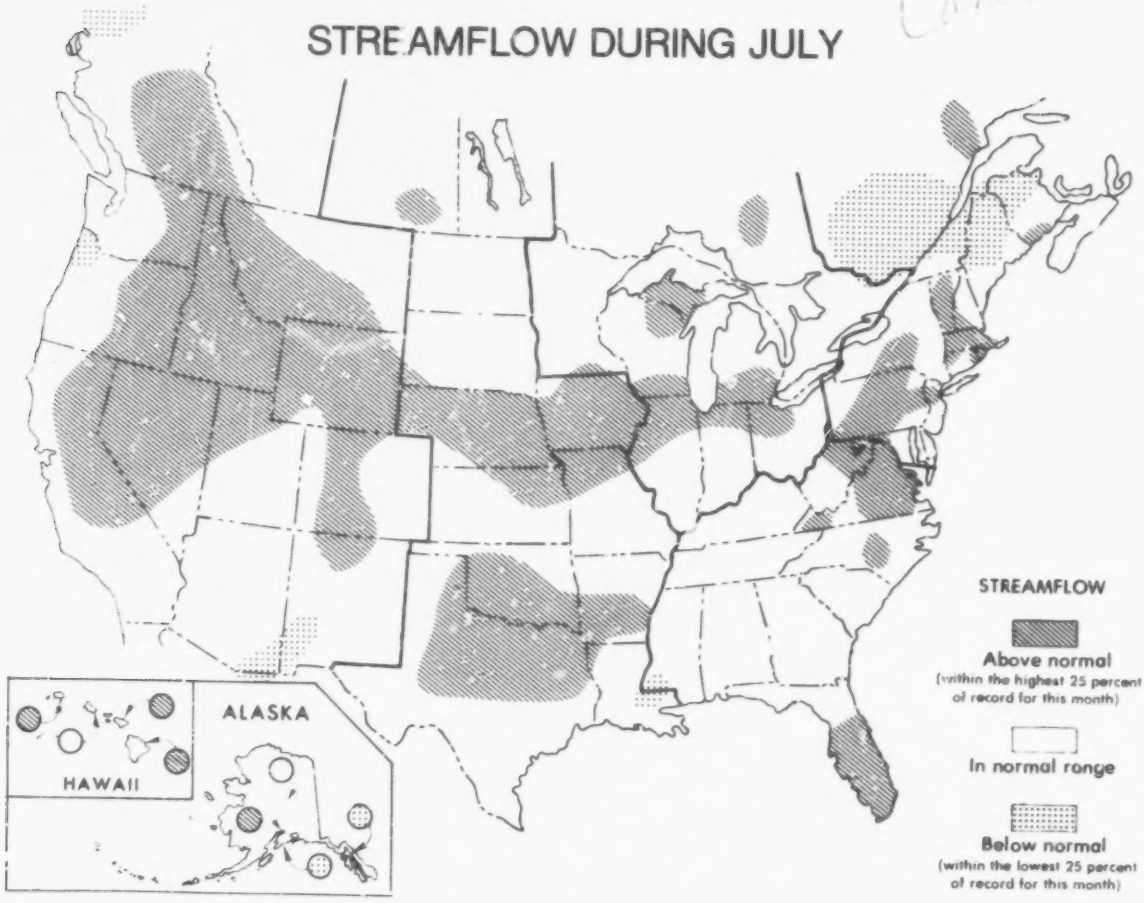
(Formerly the Water Resources Review)

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

JULY 1982



Streamflow generally decreased seasonally and was in the normal range or above that range in most of the United States and southern Canada during July. Flood peak discharges on several streams in Iowa, Illinois, and Pennsylvania were highest of record and equaled or exceeded the 100-year flood at several locations.

Reservoir storage was near or above average except in parts of Colorado, New Hampshire, New Mexico, Quebec, Texas, and Wyoming.

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STREAMFLOW CONDITIONS DURING JULY 1982

Streamflow generally decreased seasonally and was in the normal range or above that range in most of the United States and southern Canada during July, as a result of high carryover flow from June, augmented by runoff from intense rains in parts of several States during July. Monthly mean flows remained in the above-normal range in parts of most middle Atlantic States, southern Florida, and in several States from Illinois westward to a large area in and adjacent to Idaho.

Monthly mean flows were highest of record for July in parts of Kansas and Oregon, and were the second highest for period of record in parts of Hawaii, Idaho, Montana, Rhode Island, and Wyoming. For example, the monthly mean flow of 3,360 cubic feet per second (cfs) and the daily mean flow of 14,400 cfs on July 4 at Little Blue River near Barnes, Kansas (drainage area, 3,324 square miles) were highest for July in 25 years of record. Some lowland flooding occurred along the Big and Little Blue Rivers in southeastern Nebraska and northeastern Kansas during the first week in July. Similarly, the monthly mean flow of 1,980 cfs and the daily mean flow of 3,530 cfs on July 2 at John Day River at Service Creek, Oregon (drainage area, 5,090 square miles), were highest for July in 56 years of record. In southern Florida, where monthly mean discharge of Peace River at Arcadia was highest of record during June, high carryover flow held flow at that site in the above-normal range during July. (See graph on page 6.)

Severe flooding occurred in parts of Colorado, Illinois, Iowa, and Pennsylvania, and are described in the paragraphs that follow. Lower frequency floods were reported in Indiana, Kansas, Nebraska, Nevada, and Wyoming.

Runoff from intense rains caused extreme flooding in south-central **Iowa** and tributaries to the Des Moines River between Des Moines and Ottumwa. Monroe County took the brunt of two storms, receiving about 7-inch rains on both July 3 and 16 and nearly 2 feet of rain during that two-week period. Cedar Creek near Bussey responded with floods with peak discharges of 100,000 and 80,000 cfs on those respective dates. The storm on the 16th spread north into central and east-central Iowa and at one time nearly two-thirds of the State was under flash flood warnings. The accompanying table and map on page 3 shows peak stage and discharge data at selected gaging stations in Iowa, Illinois, and Pennsylvania.

In western **Illinois**, runoff from intense rains on July 7, 8 caused severe flooding in the Henderson Creek, Pope Creek, and the Edwards River basins. On July 22, runoff from heavy rains in the Chicago area produced maximum flows of record on several urban-area streams. Selected data on stages, discharges, recurrence intervals, and locations for those gaging stations are given in the accompanying map and table. In the northwestern part of the State, monthly mean flow of Rock River near Joslin increased, and remained above median for the 7th consecutive month. (See graph on page 6.)

In **Pennsylvania**, runoff from intense rains in north Philadelphia on July 28 caused record-breaking floods on several urban-area streams. At least two deaths were reported and approximately 120 people were evacuated from apartment complexes as a result of the flood. Peak stage and discharge data for selected gaging stations are given in the accompanying table.

In Larimer County in north-central **Colorado**, an earth dam on Lawn Lake collapsed and caused severe flooding in the town of Estes Park on July 15. The resulting flood on Fall River was the greatest in recorded history, caused an estimated $21 million in damages, and killed four people. Runoff from heavy rains on July 27 caused flooding in Boulder and washed out four bridges on Dry Creek near Montrose. On the following day, intense rains of up to 3 inches in Colorado Springs caused minor flooding in areas adjacent to Fountain Creek.

In northeastern **Wyoming**, runoff from heavy rains on July 24 (up to 3 inches in a 2-hour period) in the Gillette area caused high water in both the Belle Fourche and Little Powder River basins, but peak discharges on those streams generally had recurrence intervals that were less than 20 years.

Elsewhere, flash flooding was reported in west-central **Indiana** on July 8, 19, and 23, but storm activity was scattered and there were no reports of widespread flooding. Some lowland flooding was reported along the Wabash River between Terra Haute and Riverton during

(Continued on page 6.)

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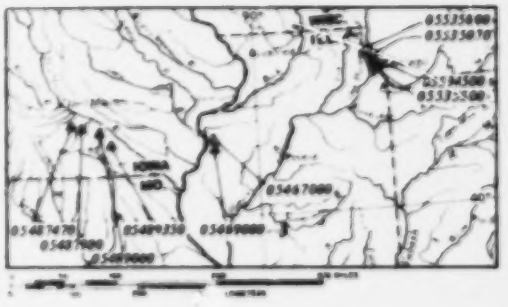
STAGES AND DISCHARGES FOR THE FLOODS OF JULY 1982 AT SELECTED SITES IN PENNSYLVANIA, ILLINOIS, AND IOWA

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
	PHILADELPHIA, PENNSYLVANIA										
	DELAWARE RIVER BASIN										
01465790	Byberry Creek at Chalfont Road	5.34	1965 - 78	Aug. 28, 1971	12.46	1,930	July 28	15.4	3,000	562	>100
01465798	Poquess Creek at Grant Avenue	21.4	1965 - 70, 1974 -	Aug. 28, 1971	13.05	7,380	28	15.35	11,000	514	>100
01467048	Pennypack Creek at Lower Rhawn Street Bridge	49.8	1965 - 70, 1974 -	Aug. 28, 1971	[a]10.25	6,630	28	13.15	11,600	233	>100
01467050	Wooden Bridge Run	3.35	1965 -	Aug. 27, 1967	12.2	1,860	28	17.19	2,800	836	75
	ILLINOIS										
	ILLINOIS RIVER BASIN										
05534500	North Branch Chicago River at Deerfield	19.7	1952 -	Mar. 5, 1976	[b]9.72	550	July 22	10.88	743	38	100
05535000	Skokie River at Lake Forest	13.0	1951 -	Aug. 23, 1972	[c]6.79	367	22	8.35	400	31	40
05535070	Skokie River near Highland Park	21.1	1967 -	Aug. 26, 1972	8.10	570	22	8.27	580	27	20
05535500	West Fork N. Branch Chicago River at Northbrook	11.5	1952 -	July 13, 1957	9.65	930	22	9.54	1,040	90	>100
	POPE CREEK BASIN										
05467000	Pope Creek near Keithsburg	583	1934 -	Apr. 22, 1973	[d]27.88	8,900	8	28.44	(e)	. . .	100
	HENDERSON CREEK BASIN										
05469000	Henderson Creek near Oquawka	432	1934 -	Apr. 25, 1950	28.17	16,500	8	30.88	(e)	. . . . .	>100
	IOWA										
	DES MOINES RIVER BASIN										
05487470	South River near Ackworth	460	1940 -	June 5, 1947	[f]24.60	34,000	July 16	31.89	25,000	54	100
05487980	White Breast Creek near Dallas	342	1962 -	July 5, 1981	26.61	12,300	16	33.37	[g]20,000	59	100
05489000	Cedar Creek near Bussey	374	1947 -	May 9, 1950	27.50	29,300	3	34.61	[g]100,000	267	>100
							16	33.20	[g]80,000	214	>100
05489350	South Avery Creek near Blakesburg	33.1	1965 -	June 9, 1967	88.95	15,000	3	90.20	[g]22,000	665	>100

[a]Maximum gage height, 10.54 ft on Aug. 27, 1967.
[b]Maximum gage height, 10.34 ft on June 20, 1972.
[c]Maximum gage height, 7.36 ft on June 20, 1972.
[d]Maximum gage height, 28.0 ft on Feb. 21, 1937.
[e]Discharge not determined.
[f]Site and datum then in use.
[g]Estimated discharge.



[Location of stream-gaging stations in Illinois and Iowa, described in table of peak stages and discharges.]

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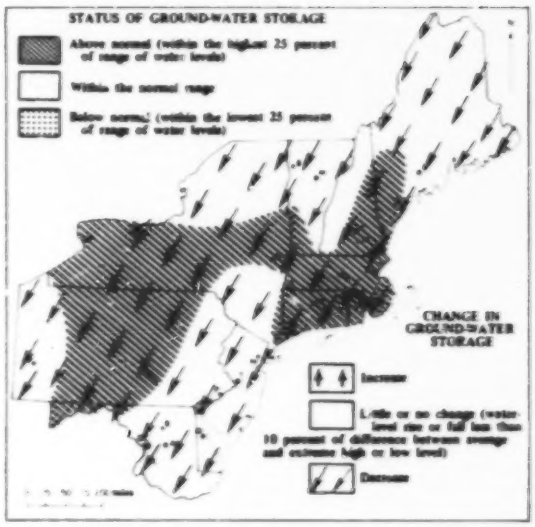
GROUND-WATER CONDITIONS DURING JULY 1982

In the northeastern States, ground-water levels generally declined seasonally. Levels near end of month were about average in much of central New England, and in large areas of New York and Pennsylvania, at least partly a carryover from unusually high levels in June. (See map.) In a few key observation wells in New York and New England, levels were the highest for the end of July in the past 20–40 years.

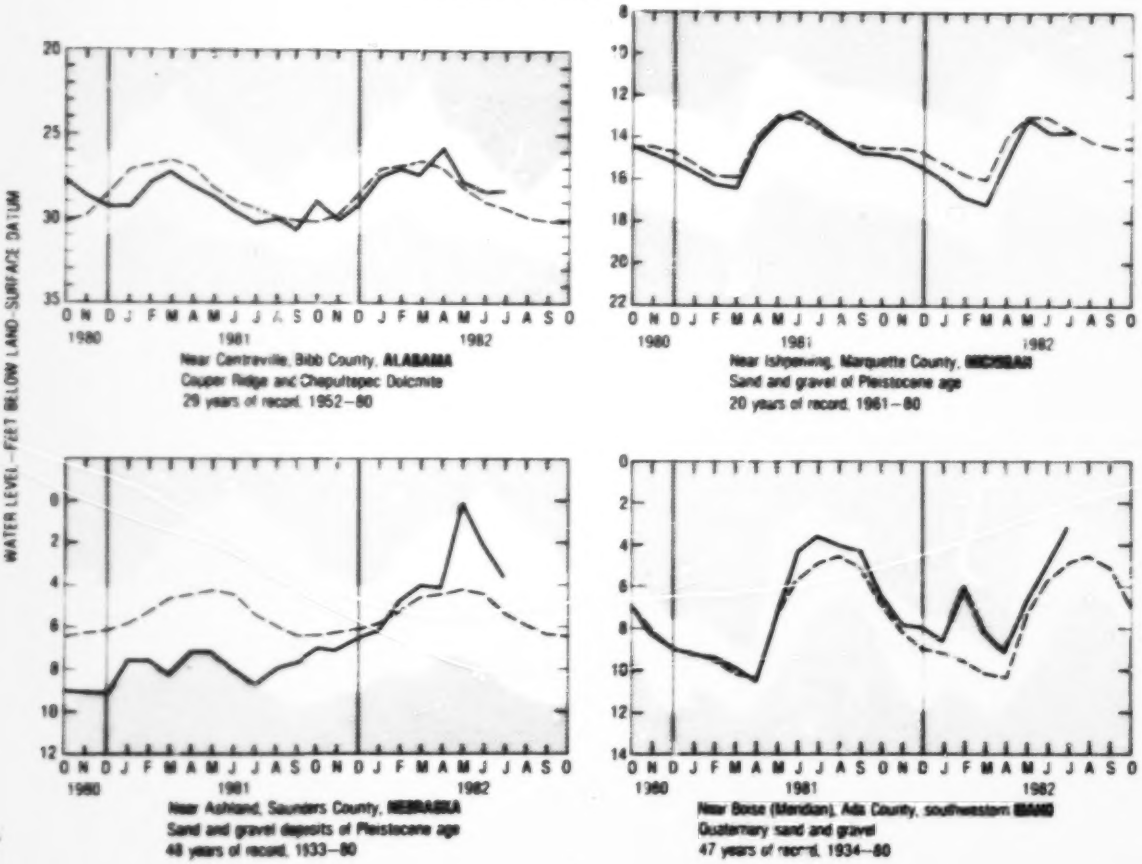
In the southeastern States, ground-water levels generally declined in Virginia and in most of West Virginia, and generally rose in Florida. Trends were mixed in Arkansas and Georgia and the Gulf States of Louisiana, Mississippi, and Alabama. Water levels were above average in Kentucky, North Carolina, and Alabama, mostly below average in West Virginia and Virginia, and near or below average in Arkansas, Louisiana, and Florida. A new low level for July was reached in the key well at Memphis, Tennessee, and a new alltime low level occurred in the index well in terrace gravel near Alexandria, Louisiana.


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Within the normal range
Below normal (within the lowest 25 percent of range of water levels)
CHANGE IN GROUND-WATER STORAGE
Increase
Little or no change (water level rise or fall less than 10 percent of difference between average and extreme high or low level)
Decrease

Map shows ground-water storage near end of July and change in ground-water storage from end of June to end of July.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DASHED LINE INDICATES AVERAGE OF MONTHLY LEVELS IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Centreville, Bibb County, ALABAMA
Cooper Ridge and Chapultepec Dolomite
29 years of record, 1952–80

Near Ishpeming, Marquette County, MICHIGAN
Sand and gravel of Pleistocene age
20 years of record, 1961–80

Near Ashland, Saunders County, NEBRASKA
Sand and gravel deposits of Pleistocene age
48 years of record, 1933–80

Near Boise (Meridian), Ada County, southwestern IDAHO
Quaternary sand and gravel
47 years of record, 1934–80

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Among the Great Lakes States, including also Iowa, ground-water levels declined in Minnesota, Michigan, and Indiana, and in much of Wisconsin except in the northeastern part. Trends were mixed in Iowa, and the level in the key well in Illinois rose. Levels were above average in Iowa, near average in Wisconsin, and mixed with respect to average in Minnesota, Michigan, and Ohio. A new high ground-water level for July was recorded in Iowa, and a new low for July occurred in the key well in northeastern Ohio.

Among the western States, ground-water levels declined in southern California, Arizona, Kansas, and Texas, and in most wells in Nebraska. Trends were mixed in other reporting States. Levels were above average in Washington and Nebraska, below average in Montana and Arizona, and mixed with respect to average elsewhere. A new high ground-water level for July occurred in Nevada, and new lows for July were reported in Idaho and Utah. New alltime lows were reached in Idaho, Arizona, and Texas.

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota	-6.00	+0.31	-1.05	+1.02	1943	
Glacial drift at Roscommon in north-central part of Southern Peninsula, Michigan	-4.46	+0.21	-0.25	+0.09	1935	
Glacial drift at Marion, Iowa	-1.74	+3.56	+0.65	+3.93	1941	July high.
Glacial drift at Princeton in northwestern Illinois	-6.98	+4.75	+1.19	+3.28	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia	-15.44	+0.13	-0.24	+0.65	1939	
Glacial outwash sand and gravel, Louisville, Kentucky	-18.22	+7.50	-0.02	-0.57	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-103.73	-15.62	-0.44	-0.40	1941	July low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina	-40.10	+1.72	+0.75	+4.18	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-229.95	-26.57	+5.45	+5.10	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-28.2	+1.2	+0.1	+2.1	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia	-24.40	-5.94	0	+2.50	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-104.58	+6.78	+0.93	+11.53	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	-457.9	+2.0	-0.8	+7.9	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	-125.8	-9.1	+1.8	-1.7	1957	
Terrace gravel at Missoula, Montana	-13.30	-1.89	-4.20	+0.90	1960	
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-3.67	+1.87	-1.55	+5.08	1935	
Alluvial valley fill in Steptoe Valley, Nevada	-11.29	+2.23	-0.62	+0.31	1950	July high.
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-124.50	-7.61	-0.03	+1.79	1947	
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California	-152.67	-7.02	-15.59	-36.37	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	-115.6	-37.39	-3.1	-2.1	1951	Alltime low.
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-67.68	+0.80	-1.29	-2.93	1966	
Hueco bolson, El Paso area, Texas	-263.23	-16.33	-0.80	-2.41	1965	Alltime low.
Evangeline aquifer, Houston area, Texas	-325.40	-28.37	-2.06	-5.92	1965	

(Continued from page 2.)

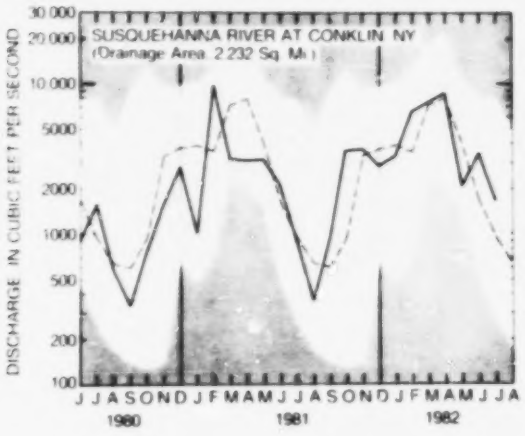
this period. In northwestern **Nevada**, some local flooding occurred near month's end and caused damage to croplands in the Yerrington area.

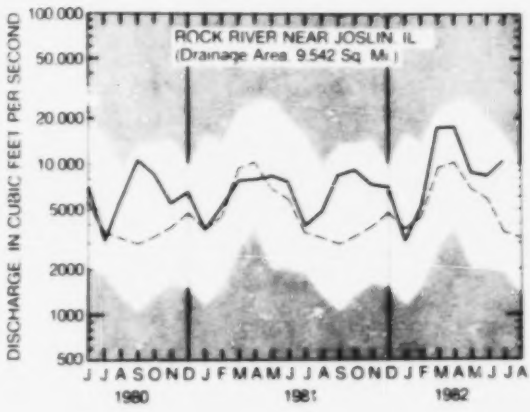
By contrast, flows remained in the below-normal range in parts of New Brunswick, Quebec, Alaska, Arizona, Lousiana, Maine, and Oregon, and decreased into that range in parts of British Columbia and New Mexico. In the coastal area of south-central Alaska, for example, the monthly mean discharge of 4,524 cfs and the daily mean flow of 2,330 cfs at Kenai River at Cooper Landing (drainage area, 634 square miles) were lowest for July in 35 years of record.

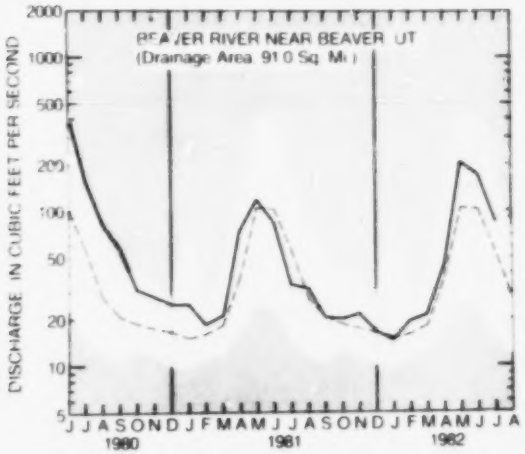
The above-normal trend in streamflow was also evident in the combined flow of three large Rivers—Mississippi, St. Lawrence, and Columbia—which averaged 1,229,700 cfs during July, 29 percent above median, and in the above-normal range for the second consecutive month. Because these three large rivers account for about half the runoff in the conterminous 48 States, their combined flow provides a quick check on the status of the Nation's water resources.

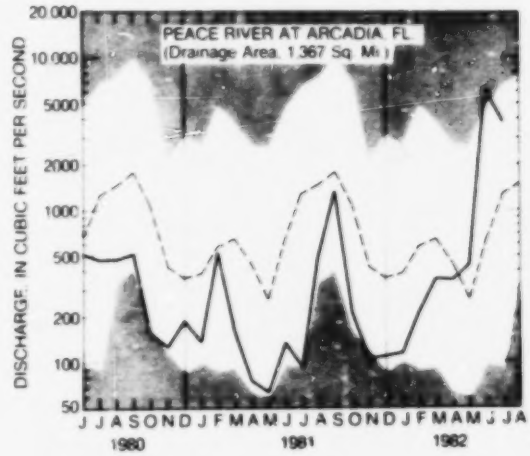
SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.









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PERENNIAL-STREAMFLOW CHARACTERISTICS RELATED TO CHANNEL GEOMETRY AND SEDIMENT IN MISSOURI RIVER BASIN

The abstract and illustrations below are from the report, *Perennial-streamflow characteristics related to channel geometry and sediment in Missouri River basin*, by W. R. Osterkamp and E. R. Hedman, U.S. Geological Survey Professional Paper 1242, 37 pages, 1982. This report may be purchased for $4.75 from Eastern Distribution Branch, USGS, 604 S. Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

Geometry, channel-sediment, and discharge data were collected and compiled from 252 streamflow-gaging stations in the Missouri River basin. (See figure 1.) The stations, with several exceptions, have at least 20 years of streamflow records and represent the complete ranges of hydrologic and geologic conditions found in the basin. The data were analyzed by computer to yield simple and multiple power-function equations relating various discharge characteristics to variables of channel geometry and bed and bank material. (See table 1.) The equations provide discharge as the dependent variable for the purpose of making estimates of discharge characteristics at ungaged sites. (See table 2.)

Results show that channel width is best related to variables of discharge, but that significant improvement, or reduction of the standard errors of estimate, can be achieved by considering channel-sediment properties, channel gradient, and discharge variability. (See figure 2.) The channel-material variables do not have uniform effects on width-discharge relations and, therefore, are considered as sediment-data groups, or stream types, rather than as terms in multiple power-function equations.

Relative to streamflow, narrowest channels occur when streams of steady discharge transport sufficient silt and clay to form stable, cohesive banks but have a small bed-material load of sand and coarser sizes. Stable channels also are associated with relatively large channel gradients, relatively large channel roughness, and armoring of bed and bank by coarse particle sizes. The widest, most unstable channels are ones that apparently transport a large bed-material load of sand sizes. The downstream rates of change of width with discharge reflect these trends, indicating that a given bed-material load necessitates a minimum width for movement of tractive material.

Comparisons of standard errors of estimate given here with similar results from regional studies are variable. It is assumed, however, that a benefit of this study is that the use of the equations is not limited to the Missouri River basin. Besides the principal utility of estimating discharge characteristics of ungaged streams, the equations given here can be used for the design of artificial channels and can be used as a basis of predicting channel changes resulting from upstream alterations of the basin or channel.

Table 1.—*Descriptions of data groups based on channel material*

Channel type	Number of sampling sites	Channel material characteristics		
High silt-clay bed	15	SC_{bed} = 61–100		d_{50} <2.0
Medium silt-clay bed	17	SC_{bed} = 31–60		d_{50} <2.0
Low silt-clay bed	10	SC_{bed} = 11–30		d_{50} <2.0
Sand bed, silt banks	33	SC_{bed} = 1–10	SC_{bk} = 70–100	d_{50} <2.0
Sand bed, sand banks	96	SC_{bed} = 1–10	SC_{bk} = 1–69	d_{50} <2.0
Gravel bed	42			d_{50} = 2.0–64
Cobble bed	19			d_{50} >64

Figure 1.—Location of study area.

Table 2.—*Width-discharge relations for channels of specified sediment properties*

[SC_{bed} is silt-clay percentage of bed material, SC_{bk} is silt-clay percentage of bank material, and d_{50} is median particle size of bed material, in millimeters; $\bar{Q}$ is mean discharge, in cubic meters per second; Q_2 through Q_{100} are flood discharges, in cubic meters per second, of recurrence intervals 2 through 100 years; and W is active-channel width, in meters]

Channel type (table 1)	Equation	Standard error of estimate, SE (percent)	Coefficient of correlation, R	Level of significance (from *F* ratio for width)
High silt-clay bed (SC_{bed} = 61–100; d_{50}<2.0)	$\bar{Q} = 0.031W^{2.12}$	35	0.98	0.001
	$Q_2 = 2.0W^{1.86}$	52	.94	.001
	$Q_5 = 5.3W^{1.77}$	54	.93	.001
	$Q_{10} = 8.1W^{1.74}$	57	.92	.001
	$Q_{25} = 13W^{1.71}$	62	.90	.001
	$Q_{50} = 16W^{1.71}$	65	.89	.001
	$Q_{100} = 19W^{1.74}$	69	.88	.001

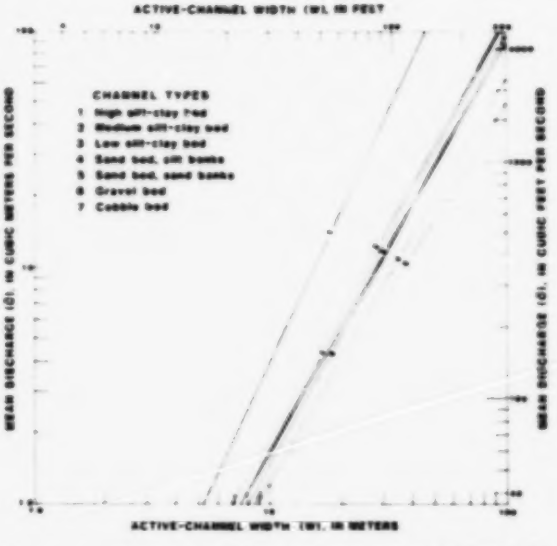
ACTIVE-CHANNEL WIDTH (W), IN FEET
CHANNEL TYPES
1 High silt-clay bed
2 Medium silt-clay bed
3 Low silt-clay bed
4 Sand bed, silt banks
5 Sand bed, sand banks
6 Gravel bed
7 Cobble bed
MEAN DISCHARGE (Q), IN CUBIC METERS PER SECOND
MEAN DISCHARGE (Q), IN CUBIC FEET PER SECOND
ACTIVE-CHANNEL WIDTH (W), IN METERS

Figure 2.—Structural relations between active-channel width and mean discharge for stream channels of specified sediment characteristics.

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FLOW OF LARGE RIVERS DURING JULY 1982

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	July 1982					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from pervious month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	2,822	60	-51	2,200	1,420	31
01318500	Hudson River at Hadley, N.Y	1,664	2,909	1,040	100	-60	400	260	31
01357500	Mohawk River at Cohoes, N.Y	3,456	5,734	2,350	125	-64	1,000	650	31
01463500	Delaware River at Trenton, N.J	6,780	11,750	7,340	152	-46	4,220	2,727	27
01570500	Susquehanna River at Harrisburg, Pa	24,100	34,530	17,600	148	-70	8,320	5,377	31
01646500	Potomac River near Washington, D.C.	11,560	[1]11,490	6,370	158	-72	5,510	3,561	31
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	3,100	158	-78	11,000	7,10[illegible]	30
02131000	Pee Dee River at Peedee, S.C	8,830	9,851	6,880	120	-63	5,760	3,722	28
02226000	Altamaha River at Doctortown, Ga	13,600	13,880	8,221	123	-21	9,930	6,417	30
02320500	Suwannee River at Branford, Fla	7,880	6,987	5,280	102	+39	7,860	5,080	31
02358000	Apalachicola River at Chattahoochee, Fla	17,200	22,570	15,600	115	+7	15,000	9,700	31
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	23,300	7,316	116	-54	6,600	4,270	30
02489500	Pearl River near Bogalusa, La	6,630	9,768	2,533	78	+15	2,580	1,667	31
03049500	Allegheny River at Natrona, Pa	11,410	[1]19,480	9,449	157	-67	5,130	3,315	26
03085000	Monongahela River at Braddock, Pa.	7,337	[1]12,510	9,420	233	-23	7,400	4,780	23
03193000	Kanawha River at Kanawha Falls, W. Va	8,367	12,590	6,385	124	-65	3,400	2,200	26
03234500	Scioto River at Higby, Ohio	5,131	4,547	1,644	97	-52	1,160	749	30
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	50,710	103	-62	13,600	8,790	27
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	23,894	154	-40	14,000	9,000	31
03469000	French Broad River below Douglas Dam, Tenn	4,543	6,798	4,115	99	-29	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[3]	6,150	4,163	3,034	126	+17	4,019	2,597	24
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	291,000	106	0	285,000	184,200	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	8,700	43	-58	12,700	8,210	30
05082500	Red River of the North at Grand Forks, N. Dak	30,100	2,551	3,180	119	-3	4,560	2,947	24
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	15,000	91	-36	16,100	10,410	26
05330000	Minnesota River near Jordan, Minn	16,200	3,402	3,952	94	-42	2,430	1,570	31
05331000	Mississippi River at St. Paul, Minn	36,800	[1]10,610	12,115	92	-40	8,270	5,345	31
05365500	Chippewa River at Chippewa Falls, Wis	5,600	5,100	3,428	108	+7	13,900	8,980	31
05407000	Wisconsin River at Muscoda, Wis	10,300	8,617	6,106	107	-7	15,100	9,760	31
05446500	Rock River near Joslin, Ill	9,551	5,873	10,400	299	+27	10,000	6,500	26
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	100,600	161	-11	72,600	46,920	31
06214500	Yellowstone River at Billings, Mont	11,796	7,038	27,150	181	-10	16,000	10,300	31
06934500	Missouri River at Hermann, Mo	524,200	79,490	135,200	178	-39	72,400	47,050	31
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	585,300	136	-33	516,000	333,500	26
07331000	Washita River near Dickson, Okla	7,202	1,368	2,285	549	-68	780	504	31
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	725	1,040	210	-46	470	303	31
09315000	Green River at Green River, Utah	40,600	6,298	7,497	131	-51	3,200	2,070	31
11425500	Sacramento River at Verona, Calif	21,257	18,820	15,100	155	-21	.....	.....	...
13269000	Snake River at Weiser, Idaho	69,200	18,050	21,432	193	-31	10,600	6,850	28
13317000	Salmon River at White Bird, Idaho	13,550	11,250	33,297	228	-50	16,200	10,470	28
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	15,143	139	-74	9,000	5,800	28
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	353,400	126	-43	221,900	143,420	28
14191000	Willamette River at Salem, Oreg.	7,280	23,510	7,160	129	-41	7,040	4,550	28
15515500	Tanana River at Nenana, Alaska	25,600	23,460	60,906	104	+10	62,000	40,100	31
8MF005	Fraser River at Hope, British Columbia	83,800	96,290	257,057	134	-16	220,688	142,634	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

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USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JULY 1982

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F—Flood control I—Irrigation M—Municipal P—Power R—Recreation W—Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of July 1982	End of July 1981	Average for end of July	End of June 1982	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Jeshood Reservoirs (P)	64	61	60	77	[b]226,300
QUEBEC					
Allard (P)	81	81	76	87	280,600
Gouin (P)	51	91	69	52	6,954,000
MAINE					
Seven reservoir systems (MP)	79	77	79	91	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	88	93	89	92	76,450
Lake Francis (FPR)	76	83	87	83	99,310
Lake Winnipesaukee (PR)	94	95	88	102	165,700
VERMONT					
Harriman (P)	81	71	78	86	116,200
Somerset (P)	82	74	82	131	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	88	79	83	95	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	84	82	82	96	780,700
Indian Lake (FMP)	90	94	90	95	103,300
New York City reservoir system (MW)	94	77		98	1,680,000
NEW JERSEY					
Wanaque (M)	96	78	81	101	85,100
PENNSYLVANIA					
Allegheny (FPR)	50	50	44	46	1,180,000
Pymatuning (FMR)	98	95	93	99	188,000
Raystown Lake (FR)	68	67	60	77	761,900
Lake Wallenpaupack (PR)	73	75	73	79	157,800
MARYLAND					
Baltimore municipal system (M)	91	86	91	86	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	95	88	90	95	288,800
Narrows (Badin Lake) (P)	92	95	97	95	128,900
High Rock Lake (P)	86	83	77	89	234,800
SOUTH CAROLINA					
Lake Murray (P)	92	91	76	96	1,614,000
Lakes Marion and Moultrie (P)	85	83	71	85	1,862,000
SOUTH CAROLINA—GEORGIA					
Clark Hill (FP)	81	50	70	78	1,730,000
GEORGIA					
Burton (PR)	96	99	91	98	104,000
Sinclair (MPR)	88	82	90	88	214,000
Lake Sidney Lanier (FMPR)	61	52	61	62	1,686,000
ALABAMA					
Lake Martin (P)	98	93	90	109	1,373,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	54	49	56	37	2,229,300
Douglas Lake (FPR)	58	60	60	68	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	77	65	76	79	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	63	60	62	70	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	71	67	77	77	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	87	90	83	85	365,000
Wisconsin River (21 reservoirs) (PR)	87	86	74	79	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	38	35	38	35	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	91	78	94	84	22,700,000
SOUTH DAKOTA					
Angostura (I)	89	64	87	95	127,600
Belle Fourche (I)	83	44	55	102	185,200
Lake Francis Case (FIP)	76	76	81	78	4,834,000
Lake Oahe (FIP)	92	69		92	22,530,000
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	99	97	100	98	1,725,000
Lewis and Clarke Lake (FIP)	89	92	94	83	477,000
NEBRASKA					
Lake McConaughy (IP)	78	75	74	85	1,948,000
OKLAHOMA					
Eufaula (FPR)	98	90	87	112	2,378,000
Keystone (FPR)	113	95	95	141	661,000
Tenkiller Ferry (FPR)	104	99	96	119	628,200
Lake Altus (FIMR)	93	26	66	84	133,000
Lake O'The Cherokees (FPR)	93	98	91	107	1,492,000
OKLAHOMA—TEXAS					
Lake Texoma (FMPRW)	99	92	101	132	2,722,000
TEXAS					
Bridgeport (IMW)	100	37	49	103	386,400
Canyon (FMR)	94	101	74	97	385,600
International Amistad (FIMPW)	97	100	74	97	3,497,000
International Falcon (FIMPW)	91	101	69	99	2,668,000
Livingston (IMW)	100	100	84	101	1,788,000
Possum Kingdom (IMPRW)	94	93	99	99	570,200
Red Bluff (PI)	13	17	24	15	307,000
Toledo Bend (P)	94	98	89	96	4,472,000
Twin Buttes (FIM)	49	46	27	49	177,800
Lake Kemp (IMW)	101	68	89	102	268,000
Lake Meredith (FWM)	40	17	38	34	796,990
Lake Travis (FIMPRW)	95	98	78	94	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	100	100	95	89	1,052,000
Franklin D. Roosevelt Lake (IP)	100	103	100	94	5,022,000
Lake Chelan (PR)	99	100	98	90	676,100
Lake Cushman (PR)	103	102	99	100	359,500
Lake Merwin (P)	105	106	105	103	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	92	75	76	98	1,235,000
Coeur d'Alene Lake (P)	98	99	82	88	238,500
Pend Oreille Lake (FP)	99	99	95	97	1,561,000
IDAHO—WYOMING					
Upper Snake River (8 reservoirs) (MP)	93	67	71	88	4,401,000
WYOMING					
Boysen (FIP)	191	92	90	78	802,000
Buffalo Bill (IP)	104	94	101	98	421,300
Keyhole (F)	30	27	50	31	190,400
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	62	54	57	64	3,056,000
COLORADO					
John Martin (FIR)	6	5	17	5	364,400
Taylor Park (IR)	83	68	91	58	106,200
Colorado—Big Thompson project (I)	53	65	72	61	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell, Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	92	84	....	89	31,620,000
UTAH—IDAHO					
Bear Lake (IPR)	92	71	67	88	1,421,000
CALIFORNIA					
Folsom (FIP)	94	67	77	96	1,000,000
Hetch Hetchy (MP)	100	88	78	100	360,400
Isabella (FIR)	92	40	41	98	568,100
Pine Flat (FI)	92	49	55	97	1,001,000
Clair Engle Lake (Lewiston) (P)	98	85	84	100	2,438,000
Lake Almanor (P)	105	78	62	109	1,036,000
Lake Berryessa (FIMW)	95	79	81	98	1,600,000
Millerton Lake (FI)	100	51	65	104	503,200
Shasta Lake (FIPR)	94	71	78	100	4,377,000
CALIFORNIA—NEVADA					
Lake Tahoe (IPR)	97	46	69	98	744,600
NEVADA					
Rye Patch (I)	91	55	66	76	194,300
ARIZONA—NEVADA					
Lake Mead and Lake Mohave (FIMP)	85	84	73	86	27,970,000
ARIZONA					
San Carlos (IP)	13	34	15	19	1,073,000
Salt and Verde River system (IMPR)	73	59	41	79	2,073,000
NEW MEXICO					
Conchas (FIR)	60	24	82	45	330,100
Elephant Butte and Caballo (FIPR)	35	36	27	38	2,453,000

[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

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Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JULY AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	July data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at	1982	7,344	92	122	2,170	1,350	4,200	26.0	20.0	30.0
	Trenton, N.J.	1945–81	7,113	57	145	.....	465	16,700	.....	18.5	33.5
	(Morrisville, Pa.)	(Extreme yr)		(1947)	(1978)		(1965)	(1969)			
			[c]4,822								
04264331	St. Lawrence River at	1982	291,000	166	166	130,000	128,000	134,000	19.0	16.0	22.0
	Cornwall, Ontario, near	1976–81	403,100	165	169	129,000	109,000	158,000	20.0	17.0	22.0
	Massena, N.Y.	(Extreme yr)		(1980–81)	(1981)		(1977)	(1976)			
	median streamflow at		[c]272,800								
	Ogdensburg, N.Y.										
	SOUTHEAST										
07289000	Mississippi River at	1982	585,300	218	268	362,000	320,000	461,000	29.0	27.5	30.0
	Vicksburg, Miss.	1976–81	488,800	200	303	316,000	163,000	633,000	29.5	23.5	34.5
		(Extreme yr)		(1981)	(1978)		(1977)	(1980)			
			[c]421,700								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1982	152,000	161	207	.....	39,200	107,000	.....	25.5	29.0
	53, near Grand Chain, Ill.	1955–81	158,900	124	276	.....	25,000	237,000	.....	16.5	31.0
	(25 miles west of Paducah,	(Extreme yr)		(1965–67	(1968)		(1966)	(1958)			
	Ky.; streamflow station		[c]143,700								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1982	135,000	269	354	114,000	68,600	167,000	27.0	23.5	30.5
	Mo. (60 miles west of St.	1976–81	90,000	201	494	79,200	44,700	190,000	28.0	22.0	32.0
	Louis, Mo.)	(Extreme yr)		(1981)	(1980)		(1977)	(1981)			
			[c]75,690								
	WEST										
14128910	Columbia River at	1982	283,000	66	79	54,900	40,200	43,000	18.0	16.5	20.0
	Warrendale, Oreg.	1976–81	171,500	66	93	38,700	12,500	65,100	18.5	16.0	21.0
	(streamflow station	(Extreme yr)		(1976)	(1977)		(1977)	(1981)			
	at The Dalles, Oreg.)		[c]279,500								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.

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NATIONAL WATER CONDITIONS

July 1982

Based on reports from the Canadian and U.S. Field offices; completed August 10, 1982

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for July are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

METRIC EQUIVALENTS OF UNITS USED IN THE NATIONAL WATER CONDITIONS

1 foot = 0.3048 meter

1 acre-foot = 1,233 cubic meters

1 million cubic feet = 28,320 cubic meters

1 cubic foot per second =
0.02832 cubic meters per second =
1.699 cubic meters per minute

1 cubic foot per second · day = 2,447 cubic meters

1 mile = 1.609 kilometers

1 square mile = 259 hectares = 2.59 square kilometers

1 million gallons = 3,785 cubic meters =
3.785 million liters

1 million gallons per day = 694.4 gallons per minute =
2.629 cubic meters per minute =
3,785 cubic meters per day

(Round-number conversions, to nearest four significant figures)

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National Water Conditions

(Formerly the Water Resources Review)

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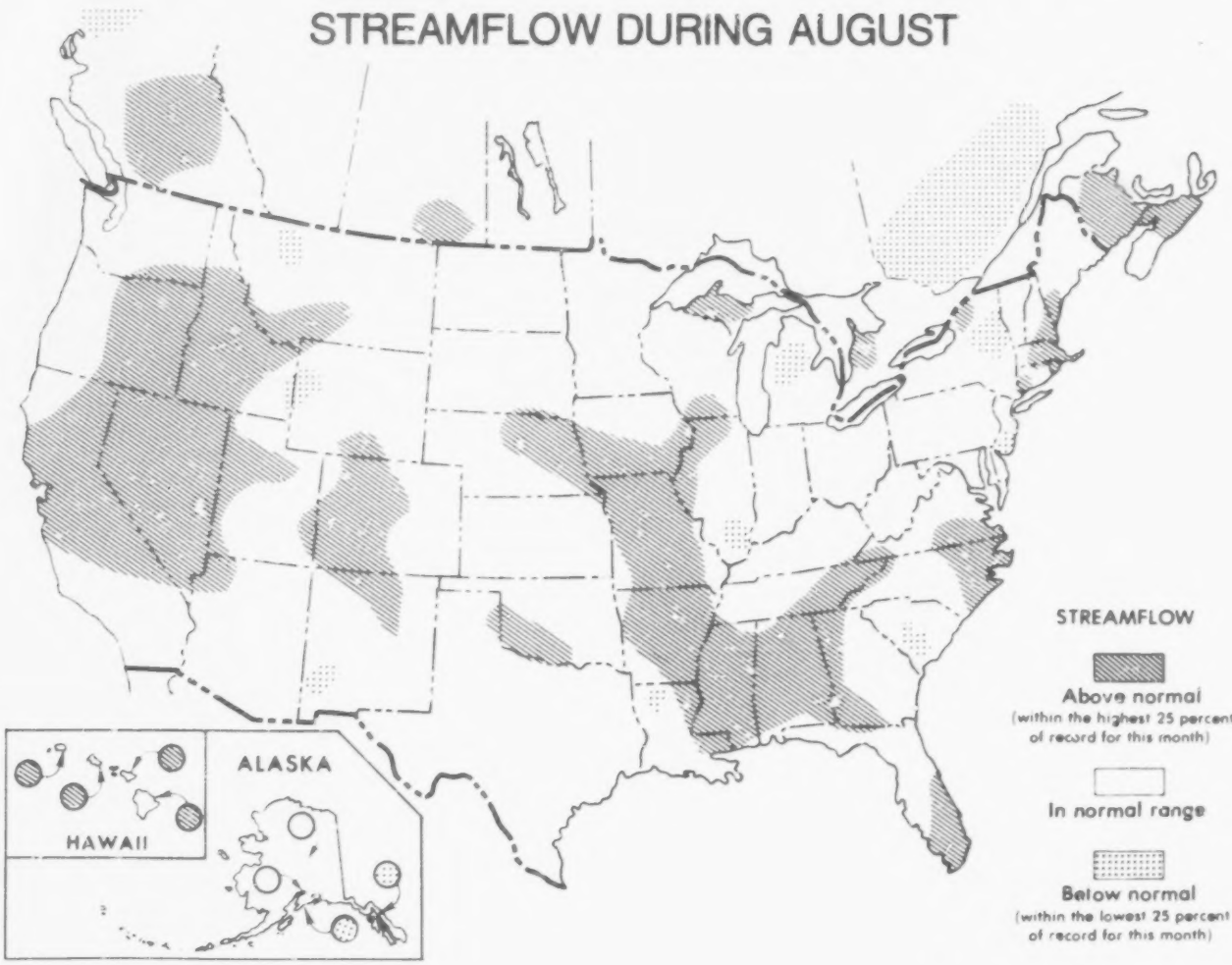
UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

AUGUST 1982

STREAMFLOW DURING AUGUST



Streamflow decreased seasonally in most of the United States and southern Canada during August. Severe flooding occurred in parts of Illinois, Missouri, and Tennessee, where several streams had peak discharges not likely to be exceeded more than once (on the average) in 100 years or more. Monthly mean flows were in the normal range or above that range at over 90 percent of the index stations during the month.

Reservoir storage generally decreased but remained above the long-term average at most of the index reservoirs.

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STREAMFLOW CONDITIONS DURING AUGUST 1982

Streamflow increased seasonally in Arizona, and increased at some index stations and decreased at others in Colorado, Connecticut, Hawaii, Illinois, Louisiana, Maine, Missouri, New Jersey, New Mexico, New York, and Texas. Monthly mean flows generally decreased seasonally elsewhere in the United States and in most of southern Canada. Flows remained in the below-normal range in parts of Alaska, British Columbia, Quebec, and New Mexico, and decreased into that range in several small areas at scattered locations throughout the conterminous United States. Monthly mean flows that were second lowest for period of record occurred in parts of Alaska and flows that were third lowest for the month of August occurred in parts of Louisiana and New York.

Monthly mean discharges remained in the above-normal range in parts of the Northwestern States, in several States adjacent to Mississippi River and also in parts of Florida, Hawaii, Massachusetts, Michigan, Rhode Island, Virginia, British Columbia, New Brunswick, and Saskatchewan. Monthly mean flows were highest of record for August in parts of Idaho and Montana, and were second and third highest for the month in parts of California, Hawaii, and Wyoming. For example, the monthly mean discharge of 9,530 cubic feet per second (cfs) at Salmon River at White Bird, Idaho (drainage area, 13,550 square miles) was highest of record for August in 72 years of record. (See graph on page 3.) Similarly, the monthly mean flow of 5,657 cfs at Yellowstone River at Corwin Springs, Montana (drainage area, 2,623 square miles) was highest for the month in 77 years of record and flow at that site remained in the above-normal range for the second consecutive month. In northeastern Kansas and the adjacent area of southeastern Nebraska, where monthly mean flow of Little Blue River near Barnes (drainage area, 3,324 square miles) was highest of record for the month of July, flow decreased sharply to 140 percent of median in August and was in the normal range. (See graph.) Runoff from intense rains on August 13 in southeastern Nebraska produced high stages and lowland flooding in the Salt Creek, Little Nemaha, and Big Nemaha River basins.

In western Missouri, rapid runoff from nearly 16 inches of rain at Raytown, a suburb of Kansas City, caused extreme flooding in the Little Blue River basin on August 13. The peak discharge of 34,900 cubic feet per second at Little Blue River near Lake City (drainage area 184 square miles) was several times greater than the estimated 100-year flood peak at that site, and was about twice as large as the previous maximum which occurred on September 13, 1977. The intense storm caused at least four deaths and estimated damage of $20 million in the Kansas City metropolitan area. Significant flooding occurred in Clay, Jackson, and Cass Counties, north and south of Kansas City.

Runoff from heavy rains on August 7 in the Chicago area caused severe flooding on several small streams. For example, the estimated peak discharge of 980 cubic feet per second in Addison Creek at Bellwood, Illinois (drainage area, 17.9 square miles) was greater than a 100-year flood event and was highest in period of record that began in 1950. The previous maximum of 706 cubic feet per second occurred on September 17, 1972.

Runoff from intense rains of 7 to 8 inches on August 16 caused severe flooding in parts of Macon, Trousdale, Smith, and Jackson Counties in north-central Tennessee. Severe damage was reported in Pleasant Shade, in northern Smith County, in the Peyton Creek basin. On August 17, another intense storm produced flooding along a wide band from Cumberland County southwest to Hamilton County. Flooding occurred in the North Chickamauga Creek basin as a result of runoff from that storm.

Local flooding occurred throughout Nevada as a result of scattered intense thunderstorms during the month. Flash flooding was reported by the National Weather Service in Clark County in the southern part of the State on August 24. Two deaths resulted from that storm in the Las Vegas area. In the north-central part of the State, monthly mean flow of Humboldt River at Palisade decreased seasonally but remained above the long-term median for the seventh consecutive month.

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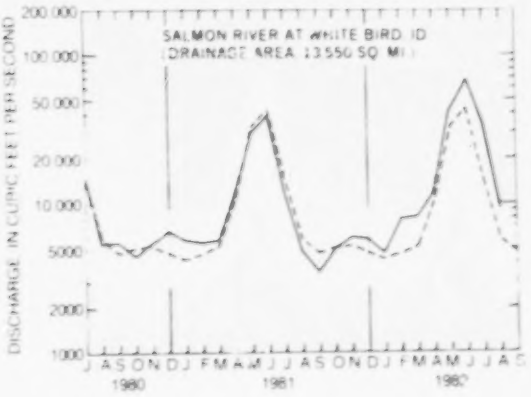
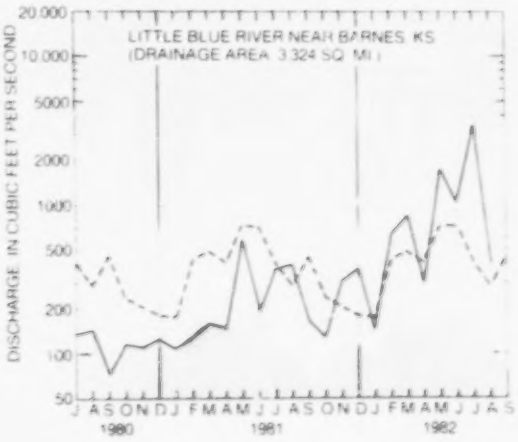
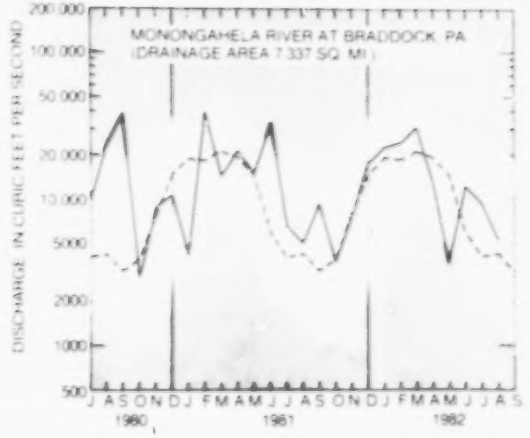
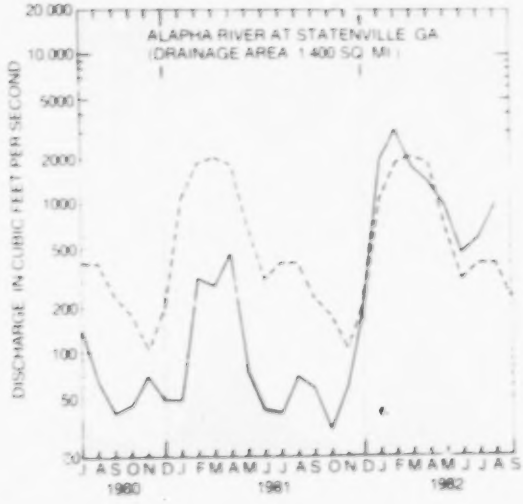
SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.









Reservoir storage generally decreased during August but was above the long-term average at most of the index reservoirs.

The above-normal trend in streamflow was again reflected in the combined flow of three large rivers—Mississippi, St. Lawrence, and Columbia—which averaged 874,100 cubic feet per second during the month, down 29 percent from July, but still 20 percent above normal for August. These three rivers, which together drain more than half of the conterminous United States, provide a quick, useful check on the status of the nation's water-resource conditions.

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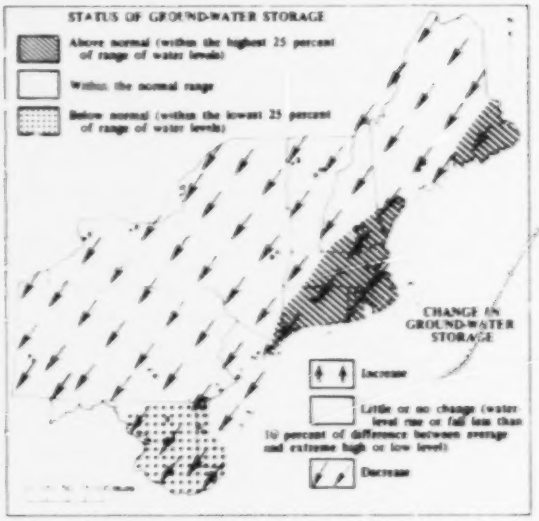
GROUND-WATER CONDITIONS DURING AUGUST 1982

In the northeastern States, ground-water levels continued to decline seasonally. Levels near end of month were near average for August in most of the region, but were far below average in most of Maryland and Delaware. Above-average levels persisted in Rhode Island, much of Connecticut and Massachusetts, and in southeastern New Hampshire and adjacent parts of Maine. (See map.) The level in one key observation well in Connecticut was the highest for August since measurements began in 1943.

In the southeastern States, ground-water levels declined in Kentucky, Mississippi, and Alabama, and declined in North Carolina except in the mountains. Trends were mixed in other States. Water levels were above average in Kentucky, North Carolina, and Alabama, below average in Arkansas and Louisiana, and mixed with respect to average elsewhere. A new low ground-water level for August was reached in the key well at Memphis, Tennessee.

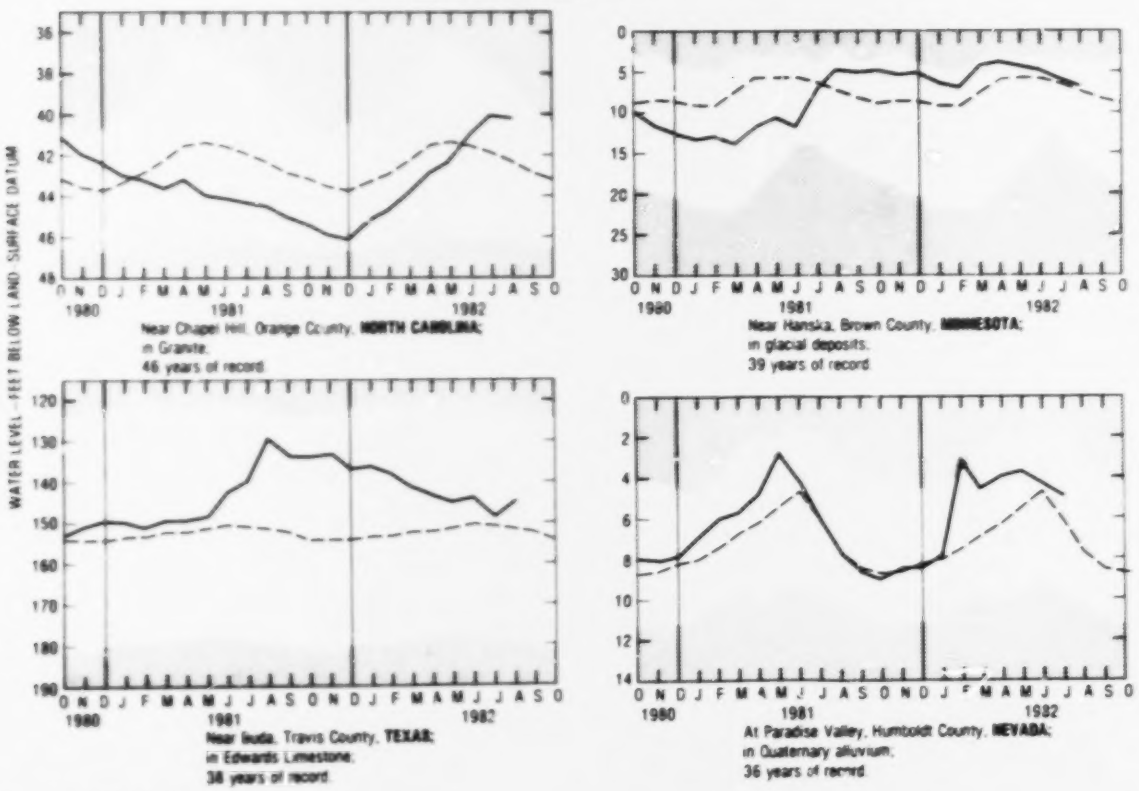
Among the Great Lakes States, including also Iowa, ground-water levels generally declined seasonally in all


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Within the normal range
Below normal (within the lowest 25 percent of range of water levels)
CHANGE IN GROUND-WATER STORAGE
Increase
Little or no change (water level rise or fall less than 10 percent of difference between average and extreme high or low level)
Decrease

Map shows ground-water storage near end of August and change in ground-water storage from end of July to end of August.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DOTTED LINE INDICATES AVERAGE OF MONTHLY LEVELS IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Chapel Hill, Orange County, **NORTH CAROLINA**; in Granite; 46 years of record.

Near Hanska, Brown County, **MINNESOTA**; in glacial deposits; 39 years of record.

Near Buda, Travis County, **TEXAS**; in Edwards Limestone; 38 years of record.

At Paradise Valley, Humboldt County, **NEVADA**; in Quaternary alluvium; 36 years of record.

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WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota	-7.52	-0.19	-1.52	-2.67	1943	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan (U.S. well no. 1)	-4.85	+0.16	-0.39	+0.11	1935	
Glacial drift at Marion, Iowa (U.S. well no. 1)	-4.18	+2.04	-2.44	+0.41	1941	
Glacial drift at Princeton in northwestern Illinois (U.S. well no. 1)	-9.44	+3.67	-2.46	-2.89	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia (U.S. well no. 4)	-15.22	+0.59	+0.22	+1.48	1939	
Glacial outwash sand and gravel, Louisville, Kentucky (U.S. Well no. 2)	-18.45	+7.32	-0.23	-0.80	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-104.00	-15.57	-0.27	-0.35	1941	August low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina (U.S. well no. 5)	-40.19	+2.06	-0.09	+4.34	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-232.90	-28.35	-2.95	+7.65	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-29.4	+0.5	0.2	+0.6	1952	
Limestone aquifer in Cockspur Island, Savannah area, Georgia	-24.60	-5.94	-0.20	+1.33	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-106.08	+5.76	-1.50	+14.20	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	457.5	+1.0	+0.1	+7.6	1929	
Snake River Group, southwestern Snake River Plain aquifer, at Eden, Idaho	-123.7	-8.7	+2.1	-0.7	1957	August low.
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-2.17	+3.94	+1.50	+5.83	1935	
Alluvial valley fill in Steptoe Valley, Nevada	-11.84	-1.83	-0.55	+0.13	1950	August high.
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-126.61	-8.60	-2.11	+0.31	1947	
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California (U.S. well no. 11)	-126.85	+17.96	+25.82	-9.20	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	-116.9	-39.69	-1.3	-2.5	1951	Alltime low.
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-68.36	+0.14	-0.68	-2.03	1966	
Hueco bolson, El Paso area, Texas	-263.27	-17.08	-0.03	-3.42	1965	Alltime low.
Evangeline aquifer, Houston area, Texas	-325.13	-25.88	+0.27	-4.53	1965	

States except Minnesota, where trends were mixed. Levels were above average in Illinois and Iowa, above and below average in Michigan, about average in Wisconsin, and below average in Minnesota and Ohio. A new low level for August was reached in a key well in central Minnesota.

Among the western States, ground-water levels rose in all but one of the key wells in Idaho, and declined in Washington, North Dakota, Kansas, and in most of Nebraska and New Mexico. Trends were mixed in other States. Levels were below average in Arizona and mixed with respect to average in other States. A new high ground-water level for August was recorded in Nevada, and new lows for August occurred in Idaho and New Mexico. New alltime lows were recorded in Arizona and Texas.

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Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF AUGUST

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

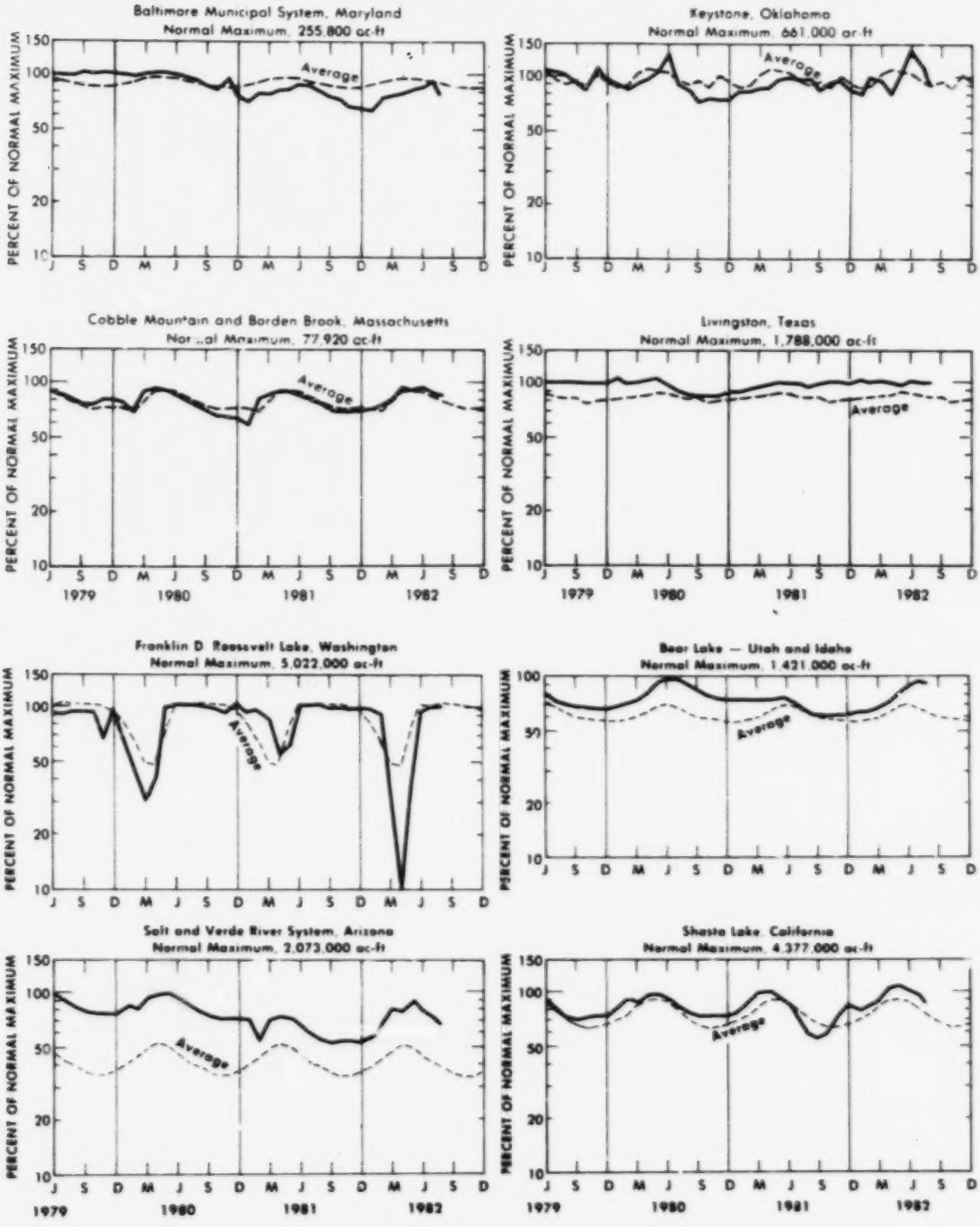
Reservoir Principal uses F—Flood control I—Irrigation M—Municipal P—Power R—Recreation W—Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Aug. 1982	End of Aug. 1981	Average for end of Aug.	End of Aug. 1982	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	55	49	49	64	[b]226,300
QUEBEC					
Allard (P)	76	92	68	81	280,600
Gouin (P)	46	82	68	51	6,954,000
MAINE					
Seven reservoir systems (MP)	68	80	68	79	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	82	84	84	88	76,450
Lake Francis (FPR)	74	90	82	76	99,310
Lake Winnipesaukee (PR)	83	88	75	94	165,700
VERMONT					
Harriman (P)	73	69	70	81	116,200
Somerset (P)	70	63	76	82	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	83	75	78	88	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	71	73	71	84	786,700
Indian Lake (FMP)	89	95	73	90	103,300
New York City reservoir system (MW)	84	67		94	1,680,000
NEW JERSEY					
Wanaque (M)	89	66	74	96	85,100
PENNSYLVANIA					
Allegheny (FPR)	43	41	42	50	1,180,000
Pymatuning (FMR)	95	88	87	98	188,000
Raystown Lake (FR)	68	71	60	68	761,900
Lake Wallenpaupack (PR)	73	64	64	73	157,860
MARYLAND					
Baltimore municipal system (M)	78	80	88	91	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	94	87	88	95	286,800
Narrows (Badin Lake) (P)	92	122	98	92	128,900
High Rock Lake (P)	72	51	74	86	234,800
SOUTH CAROLINA					
Lake Murray (P)	87	89	72	92	1,614,000
Lakes Marion and Moultrie (P)	86	84	68	85	1,862,000
SOUTH CAROLINA—GEORGIA					
Clark Hill (FP)	81	48	66	81	1,730,090
GEORGIA					
Button (PR)	97	89	87	96	104,000
Sinclair (MPR)	87	79	86	88	214,000
Lake Sidney Lanier (FMPR)	61	46	58	61	1,686,000
ALABAMA					
Lake Martin (P)	95	89	86	98	1,373,000
TENNESSEE VALLEY					
Clinch Projects—Norris and Melton Hill Lakes (FPR)	36	43	46	54	2,229,300
Douglas Lake (FPR)	52	39	46	58	1,394,000
Hiwassee Projects—Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	73	57	68	77	1,012,000
Holston Projects—South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	57	52	54	63	2,880,000
Little Tennessee Projects—Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	66	60	68	71	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	77	81	76	87	865,000
Wisconsin River (21 reservoirs) (PR)	73	68	64	87	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	35	34	35	38	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	92	76	94	91	22,700,000
SOUTH DAKOTA					
Angostura (I)		57	76	39	127,600
Belle Fourche (I)			38	83	185,200
Lake Francis Case (FIP)	77	77	77	76	4,834,000
Lake Oahe (FIP)	89	68		92	22,530,000

Reservoir Principal uses F—Flood control I—Irrigation M—Municipal P—Power R—Recreation W—Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Aug. 1982	End of Aug. 1981	Average for end of Aug.	End of Aug. 1982	
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	100	101	100	99	1,725,000
Lewis and Clarke Lake (FIP)	94	92	96	89	477,000
NEBRASKA					
Lake McConaughy (IP)	74	75	68	78	1,948,000
OKLAHOMA					
Eufaula (FPR)	83	84	81	98	2,378,000
Keystone (FPR)	91	96	90	113	661,000
Tenkiller Ferry (FPR)	94	101	91	104	628,200
Lake Altus (FIMR)	72	8	48	93	137,000
Lake O'The Cherokees (FPR)	86	90	83	93	1,492,000
OKLAHOMA—TEXAS					
Lake Texoma (FMPRW)	95	88	92	99	2,722,000
TEXAS					
Bridgeport (FMW)	99	30	45	100	386,400
Canyon (FMR)	94	94	74	94	385,600
International Amistad (FIMPW)	93	101	82	97	3,497,000
International Falcon (FIMPW)	79	106	67	91	2,668,000
Livingston (IMW)	100	96	83	100	1,768,000
Possum Kingdom (IMPRW)	92	89	99	94	570,200
Red Bluff (FI)	14	17	22	13	307,000
Toledo Bend (P)	88	88	84	94	4,472,000
Twin Buttes (FIM)	43	40	28	49	177,800
Lake Kemp (IMW)	94	60	83	101	268,000
Lake Meredith (FWM)	47	31	39	40	796,900
Lake Travis (FIMPRW)	103	90	75	95	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	98	98	94	100	1,052,000
Franklin D. Roosevelt Lake (IP)	100	103	104	100	5,022,000
Lake Chelan (PR)	84	99	94	99	676,100
Lake Cushman (PR)	102	97	96	103	359,500
Lake Merwin (P)	104	107	103	105	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	75	55	57	92	1,235,000
Coeur d'Alene Lake (P)	98	98	75	98	238,500
Pend Oreille Lake (FP)	98	99	100	99	1,561,000
IDAHO—WYOMING					
Upper Snake River (8 reservoirs) (MP)	82	47	55	93	4,401,000
WYOMING					
Boysen (FIP)	100	90	86	101	802,000
Buffalo Bill (IP)	98	74	89	104	421,300
Keyhole (F)	29	26	47	30	190,400
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	54	45	48	62	3,056,000
COLORADO					
John Martin (FIR)	3	9	16	6	364,400
Taylor Park (IR)	84	60	77	83	106,200
Colorado—Big Thompson project (I)	33	55	63	53	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell, Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	92	82		92	31,620,000
UTAH—IDAHO					
Bear Lake (IPR)	91	65	62	92	1,421,000
CALIFORNIA					
Folsom (FIP)	87	62	67	94	1,000,000
Hetch Hetchy (MP)	98	75	69	100	360,400
Isabella (FIR)	74	32	31	92	568,100
Pine Flat (FI)	69	31	41	92	1,001,050
Clair Engle Lake (Lewiston) (P)	93	78	78	98	2,438,000
Lake Almanor (P)	97	75	56	105	1,036,000
Lake Berryessa (FIMW)	92	76	78	95	1,600,000
Millerton Lake (FI)	76	86	42	100	503,200
Shasta Lake (FIPR)	86	59	70	94	4,377,000
CALIFORNIA—NEVADA					
Lake Tahoe (IPR)	92	36	61	97	744,600
NEVADA					
Rye Patch (I)	92	44	60	91	194,300
ARIZONA—NEVADA					
Lake Mead and Lake Mohave (FIMP)	86	83	72	85	27,970,000
ARIZONA					
San Carlos (IP)	9	29	14	13	1,073,600
Salt and Verde River system (IMPR)	68	55	39	73	2,071,000
NEW MEXICO					
Conchas (FIR)	74	45	85	60	330,100
Elephant Butte and Caballo (FIPR)	32	32	25	35	2,453,000

[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

BEST DOCUMENT AVAILABLE

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1979 TO AUGUST 1982



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Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING AUGUST 1982

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	August 1982					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	2,694	65	-5	4,000	2,600	31
01318500	Hudson River at Hadley, N.Y.	1,664	2,909	728	69	-30	650	420	31
01357500	Mohawk River at Cohoes, N.Y.	3,456	5,734	1,070	66	-54	560	361	31
01463500	Delaware River at Trenton, N.J.	6,780	11,750	5,338	117	-27	4,620	2,985	31
01570500	Susquehanna River at Harrisburg, Pa.	24,100	34,530	7,560	87	-57	5,500	3,550	30
01646500	Potomac River near Washington, D.C.	11,560	[1] 11,490	4,190	120	-34	2,480	1,602	31
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	2,800	111	-10	1,100	710	30
02131000	Pee Dee River at Peedee, S.C.	8,830	9,851	6,080	113	-12	4,270	2,759	29
02226000	Altamaha River at Doctortown, Ga.	13,600	13,880	7,506	126	-9	5,460	3,528	[6]
02320500	Suwannee River at Branford, Fla.	7,880	6,987	7,150	130	+35	6,580	4,252	31
02358000	Apalachicola River at Chattahoochee, Fla.	17,200	22,570	21,300	159	+37	13,100	8,470	31
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	23,300	8,750	184	+20	4,950	3,199	27
02489500	Pearl River near Bogalusa, La.	6,630	9,768	5,590	207	+121	1,980	1,279	31
03049500	Allegheny River at Natrona, Pa.	11,410	[1] 19,480	5,309	96	-44	4,880	3,154	25
03085000	Monongahela River at Braddock, Pa.	7,337	[1] 12,510	5,348	125	-43	5,400	3,490	25
03193000	Kanawha River at Kanawha Falls, W. Va.	8,367	12,590	5,235	116	-18	3,040	1,964	25
03234500	Scioto River at Higby, Ohio	5,131	4,547	896	72	-45	875	565	31
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	31,340	85	-38	31,000	20,000	25
03377500	Wabash River at Mount Carmel, Ill.	28,635	27,220	9,962	109	-58	8,900	5,750	31
03469000	French Broad River below Douglas Dam, Tenn.	4,543	6,798	6,531	202	+59	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,163	2,467	114	-19	1,398	903	23
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	277,700	105	-5	277,000	179,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	5,290	31	-39	16,200	10,470	30
05082500	Red River of the North at Grand Forks, N. Dak.	30,100	2,551	1,880	164	-41	1,400	900	24
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	15,000	149	0	11,400	7,370	28
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	1,461	112	-63	836	540	28
05331000	Mississippi River at St. Paul, Minn.	36,800	[1] 10,510	5,658	77	-53	4,110	2,656	27
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	2,948	101	-14	1,550	1,001	21
05407000	Wisconsin River at Muscoda, Wis.	10,300	8,617	5,520	104	-10	3,910	2,527	23
05446500	Rock River near Joslin, Ill.	9,551	5,873	7,140	222	-31	5,150	3,328	31
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	54,300	135	-46	48,600	31,410	31
06214500	Yellowstone River at Billings, Mont.	11,796	7,038	8,300	152	-69	5,900	3,810	31
06934500	Missouri River at Hermann, Mo.	524,200	79,490	103,700	185	-23	145,000	93,700	31
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	429,600	131	-27	372,000	240,400	30
07331000	Washita River near Dickson, Okla.	7,202	1,368	691	197	-70	344	222	31
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex.	9,730	725	760	263	-27	700	450	31
09315000	Green River at Green River, Utah.	40,600	6,298	3,727	116	-50	3,370	2,178	24
11425500	Sacramento River at Verona, Calif.	21,257	18,820	17,860	166	+18	.....	.....	...
13269000	Snake River at Weiser, Idaho	69,200	18,050	11,900	107	-44	12,810	8,279	29
13317000	Salmon River at White Bird, Idaho	13,550	11,250	9,530	165	-71	6,460	4,175	29
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	5,266	127	-65	4,010	2,591	29
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	166,800	116	-53	130,700	84,470	25
14191000	Willamette River at Salem, Oreg.	7,280	23,510	4,268	106	-40	7,900	5,110	25
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	47,521	86	-22	37,700	24,370	31
8MF005	Fraser River at Hope, British Columbia.	83,800	96,290	173,725	137	-32	117,935	76,223	30

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

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Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR AUGUST AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	August data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1982	5,338	111	132	1,780	1,292	3,977	24.5	20.5	27.0
		1945–81	6,174	67	158	.....	505	21,500	.....	17.5	31.5
		(Extreme yr)		(1945)	(1967)		(1965)	(1955)			
			[c]4,547								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. median streamflow at Ogdensburg, N.Y.	1982	278,000	165	166	124,000	122,000	126,000	20.5	19.5	21.5
		1976–81	285,400	164	170	128,000	113,000	153,000	21.5	19.0	24.0
		(Extreme yr)		(1981)	(1978)		(1977)	(1976)			
			[c]263,600								
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1982	429,600	215	299	301,000	226,000	348,000	29.0	27.5	31.5
		1976–81	403,000	200	250	258,000	118,000	442,000	29.5	26.0	34.0
		(Extreme yr)		(1980)	(1978)		(1977)	(1979)			
			[c]337,450								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	1982	*122,000	153	196	.....	27,000	73,500	.....	26.5	29.0
		1955–81	139,300	128	339	.....	4,490	246,000	.....	17.0	30.5
		(Extreme yr)		(1963)	(1977)		(1981)	(1958)			
			[c]121,500								
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1982	104,000	247	455	95,500	65,500	180,000	26.0	23.5	31.0
		1976–81	65,820	218	535	69,500	43,000	125,000	27.0	24.5	30.0
		(Extreme yr)		(1981)	(1979)		(1977)	(1981)			
			[c]55,910								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1982	159,000	80	82	34,800	19,900	49,300	20.5	19.0	21.5
		1976–81	137,000	71	100	32,200	14,200	52,500	20.5	18.5	22.0
		(Extreme yr)		(1976)	(1977)		(1978)	(1976)			
			[c]143,550								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.
*Maximum and minimum dissolved solids discharge are for the first 21 days of the month.

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SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES— NEW ENGLAND REGION

The abstract and illustrations below are from the report, *Summary appraisals of the Nation's ground-water resources—New England Region*, by Allen Sinnott: U.S. Geological Survey Professional Paper 813-T, 23 pages, 1982. This report may be purchased for $3.50 from the Eastern Distribution Branch, Text Products Section, U.S. Geological Survey, 604 South Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

The New England Region has a total area of about 62,400 square miles (160,000 km^2) and includes the States of Maine and New Hampshire, eastern Vermont, most of Massachusetts and Connecticut, all of Rhode Island, and a small part of southeastern New York. (See figures 1 and 2.) The longest stream is the Connecticut River, which extends from northern Vermont and New Hampshire, through western Massachusetts and central Connecticut, and drains into Long Island Sound. Other major streams are the Penobscot and Kennebec Rivers in Maine, the Androscoggin in Maine and New Hampshire, the Merrimack in New Hampshire and Massachusetts, and the Housatonic in western Massachusetts and Connecticut. Of the smaller streams, some like the Charles River in the Boston area, are widely known because of their proximity to large population centers.

Ground water occurs in two types of geologic materials: consolidated rocks and unconsolidated sedimentary rocks. The consolidated rocks underlie the entire region. They include crystalline igneous and metamorphic rocks and consolidated sedimentary rocks—shale, sandstone, and limestone and other carbonate rocks. The most productive unconsolidated rocks are sand and gravel of glacial origin. These deposits occur all over Cape Cod and nearby islands in southeastern Massachusetts and in many valleys throughout the region.

Ground water is derived from precipitation. It can be intercepted for use by pumping from wells (1) before it discharges to the streams as base flow and (2) before it drains directly into coastal wetlands, bays, Long Island Sound, or the ocean.

Withdrawals of fresh ground water in 1975 aggregated about 220 billion gallons (830 hm^3), or about 12 percent of the total freshwater withdrawals (from all sources) of 1,800 billion gallons (6,800 hm^3). In view of the available ground-water reserves, considerable additional water, for the anticipated continuing increase in population and economic activity, could be developed.

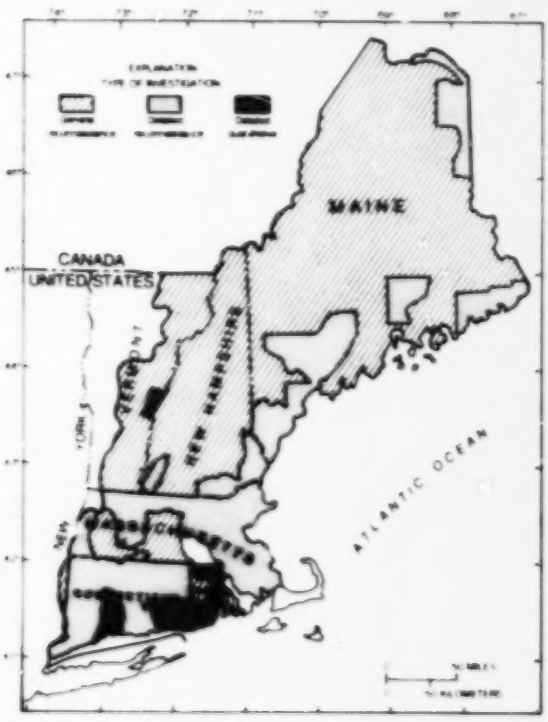

Figure 1.—Ground-water investigations that have been made in the New England Region as of 1981.

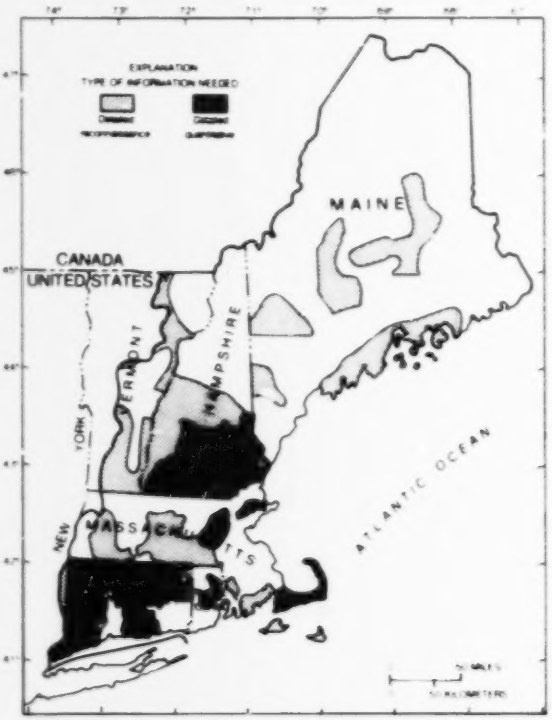

Figure 2.—Additional ground-water information is needed in parts of the New England Region to assist water-resources development and management.

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NATIONAL WATER CONDITIONS

August 1982

Based on reports from the Canadian and U.S. Field offices; completed September 10, 1982

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for August are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

METRIC EQUIVALENTS OF UNITS USED IN THE NATIONAL WATER CONDITIONS

1 foot = 0.3048 meter

1 acre-foot = 1,233 cubic meters

1 million cubic feet = 28,320 cubic meters

1 cubic foot per second =
0.02832 cubic meters per second =
1.699 cubic meters per minute

1 cubic foot per second · day = 2,447 cubic meters

1 mile = 1.609 kilometers

1 square mile = 259 hectares = 2.59 square kilometers

1 million gallons = 3,785 cubic meters =
3.785 million liters

1 million gallons per day = 694.4 gallons per minute =
2.629 cubic meters per minute =
3,785 cubic meters per day

(Round-number conversions, to nearest four significant figures)

OCT 27 1982

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National Water Conditions

(Formerly the Water Resources Review)

COMPLETED

12

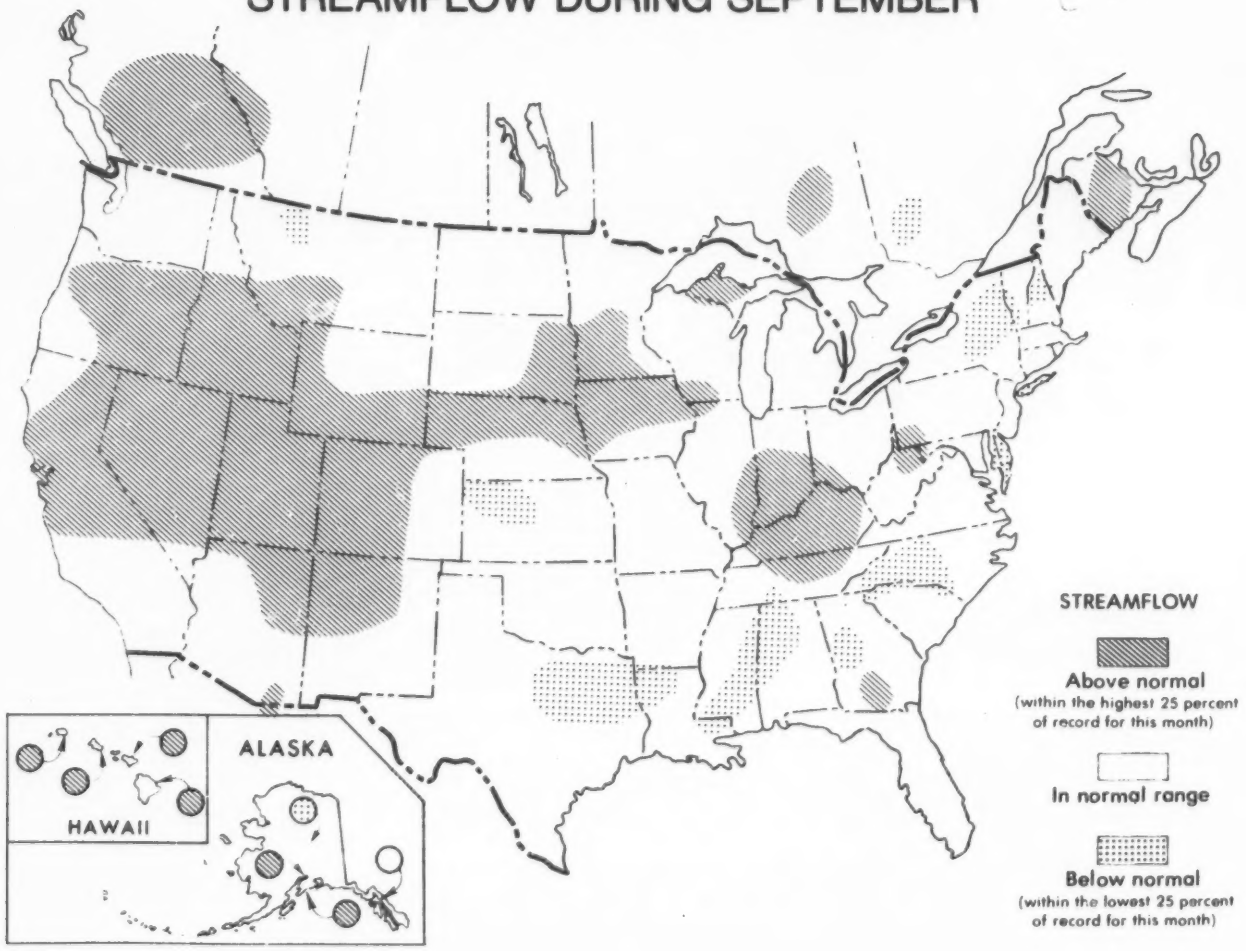
UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

SEPTEMBER 1982

ORIGINAL

STREAMFLOW DURING SEPTEMBER



Streamflow in the United States and southern Canada was generally in the normal range or above that range during September. Monthly mean flows were below the normal range in parts of at least 12 States, and were lowest of record in parts of Louisiana.

Flood peak discharges on several streams in northern Utah were highest of record and equaled or exceeded the 100-year flood at several locations.

Reservoir storage generally decreased but was near or above average at most index reservoirs at month's end.

STREAMFLOW CONDITIONS DURING SEPTEMBER 1982

Streamflow generally decreased seasonally from the higher flows of August in Hawaii, West Virginia, southwestern Canada and at most index stations in the northern Rocky Mountain States, and in most coastal States extending from New Hampshire south to Florida and then west to eastern Texas; flows generally increased in Quebec, New Brunswick, Kentucky, and Rhode Island, and were variable elsewhere. Monthly mean flows were below the normal range — within the lowest 25 percent of record — in parts of at least 12 States located mostly in the Southeast. In northern Louisiana, for example, the monthly mean discharge of 4.1 cubic feet per second (cfs) and the daily mean flow of 3.0 cfs on September 9 at Saline Bayou near Lucky (drainage area, 154 square miles) were lowest for the month in 43 years of record. In southwestern Louisiana, monthly mean flow of Calcasieu River near Oberlin decreased to 87 percent of the September median flow but was within the normal range. (See graph.) Daily mean flows were also lowest of record for the month in parts of Arizona and New Mexico.

Monthly mean flows were above the normal range — within the highest 25 percent of record — in a large area that included several States in the mid-continent and most western States, and another area that included most of the lower Ohio River Valley. Monthly and/or daily mean flows were highest of record for September in parts of California, Nevada, Utah, Idaho, and British Columbia. For example, on the eastern slope of the Sierra Nevada in northern California, the monthly mean flow of 232 cfs and the daily mean flow of 1,110 cfs on September 26 at West Walker River below Little Walker River, near Coleville were highest for the month in 45 years of record. Also in northern California but on the Sierra Nevada western slope, the monthly mean flow of 82.5 cfs at North Fork American River at North Fork Dam (drainage area, 342 square miles) was highest for the month in 42 years of record at that site. Similarly, in north-central Nevada, the monthly mean flow of 118 cfs and the daily mean discharge of 734 cfs on September 27 at Humboldt River at Palisade (drainage area, 5,010 square miles) were highest for September in 77 years of record. In southern Idaho, monthly mean flows at index stations on the Snake River located at Heise and at Weiser were highest for September in 73 years of record.

Runoff from heavy rains late in the month caused severe flooding in northern Utah, particularly in the Salt Lake City area. Combined flow of the Surplus Canal and the Jordan River, which are the main drains for Salt Lake County, reached a record-high flow of about 2,800 cfs. The previous combined maximum for 38 years of record was 2,200 cfs on September 18, 1978. Estimated peak discharges on Big and Little Cottonwood Creeks were between 1,000 and 1,200 cfs on September 26. Flood flows on both streams were highest of record and will probably exceed the flow that would be expected on the long-term average, of only once in 100 years. Responding to nearly 7 inches of rain and inflow from swollen streams, the water surface of Great Salt Lake rose 0.30 foot from August and was 2 feet higher than at the end of September 1981.

Flash floods on September 13, 14 caused extensive damage in parts of Letcher, Pike, Knott, Perry, and Floyd Counties, in eastern Kentucky. Yonts Fork and Wrights Fork, tributaries to the Kentucky River, caused severe flooding in Letcher County, and there was flash flooding at Rowland in Lincoln County as a result of overflows from Neal's Creek.

Rapid runoff from rains totaling 3 to 9 inches in southwestern and south-central Indiana on September 1–3 caused flash flooding in Clay, Green, Jackson, Lawrence, Vigo, and Washington Counties. Lowland flooding also occurred along the White River between Elliston and Hazelton and along the East Fork White River downstream from Portersville during this period. Stages on the White River at Newberry, Elliston, and Edwardsport were highest for September since 1926.

CONTENTS

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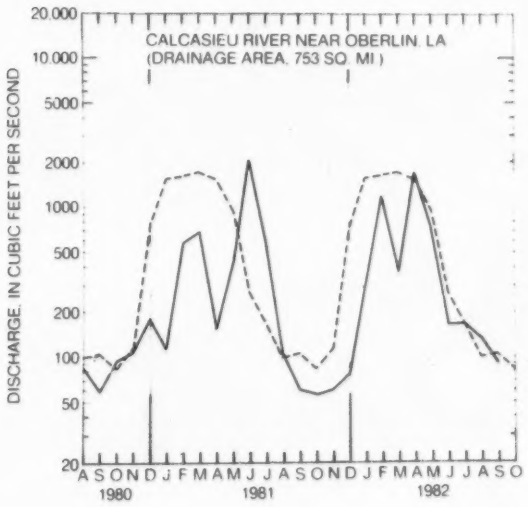
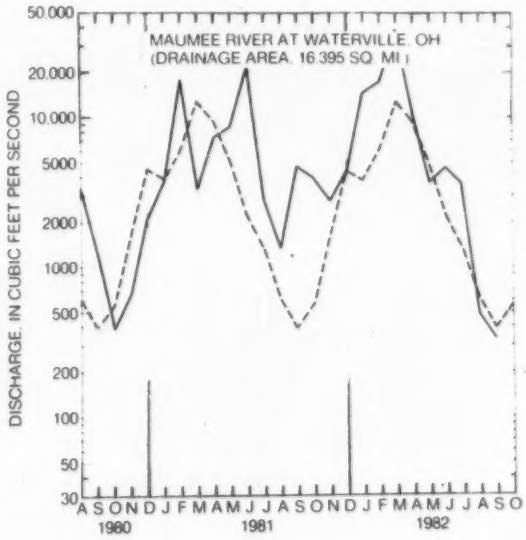
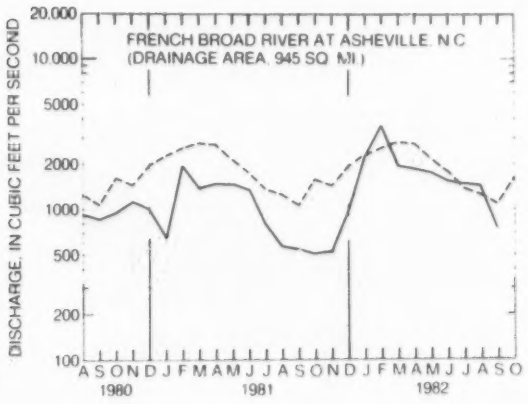
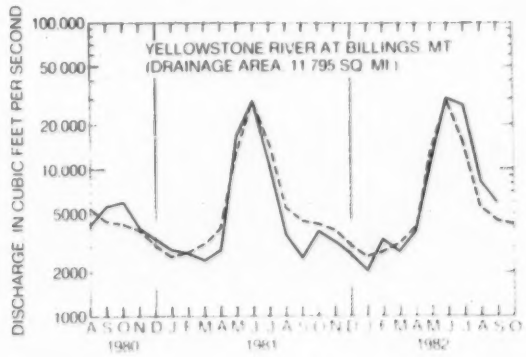
SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.









In east-central California, a small earth-fill dam on Long Creek failed on September 26 and released about 48 acre-feet of water. Several homes were destroyed in Big Pine. The failure occurred following three days of heavy rain in the area.

Reservoir storage generally decreased during September but remained above the long-term average at most of the index reservoirs.

The combined flow of three large rivers—Mississippi, St. Lawrence, and Columbia—remained in the above-normal range for the 4th consecutive month and averaged 813,600 cubic feet per second during September. These three rivers, which together drain more than half of the conterminous United States, provide a quick useful check on the status of the Nation's water resources.

Streamflow for the 1982 water year that ended September 30, 1982 was in the normal range or above that range at most locations in the United States and southern Canada. Notable exceptions included one large area of below-normal streamflow in Louisiana and parts of Mississippi and Arkansas, and another in southern Canada, north of the Great Lakes. (See map on page 10.)

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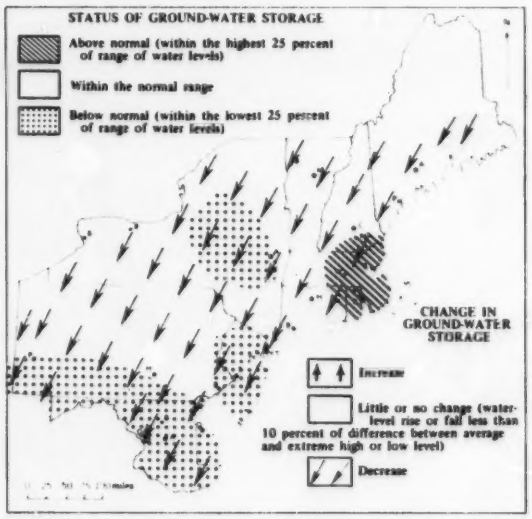
GROUND-WATER CONDITIONS DURING SEPTEMBER 1982

In the northeastern States, ground-water levels continued to decline seasonally in most of the Northeast. Levels continued to be below average in Maryland and Delaware, and were below-average also in much of New Jersey and east-central New York State. Levels remained above average in some areas of southeastern New England.

In the southeastern States, ground-water levels declined in Virginia and Mississippi; trends were mixed in other States. Water levels were above average in North Carolina, below average in Arkansas and in much of Louisiana and Florida, and about average in Alabama. Levels were above and below average elsewhere. A new high ground-water level for September was reached in Kentucky, and new low levels for September occurred in Tennessee and Louisiana.

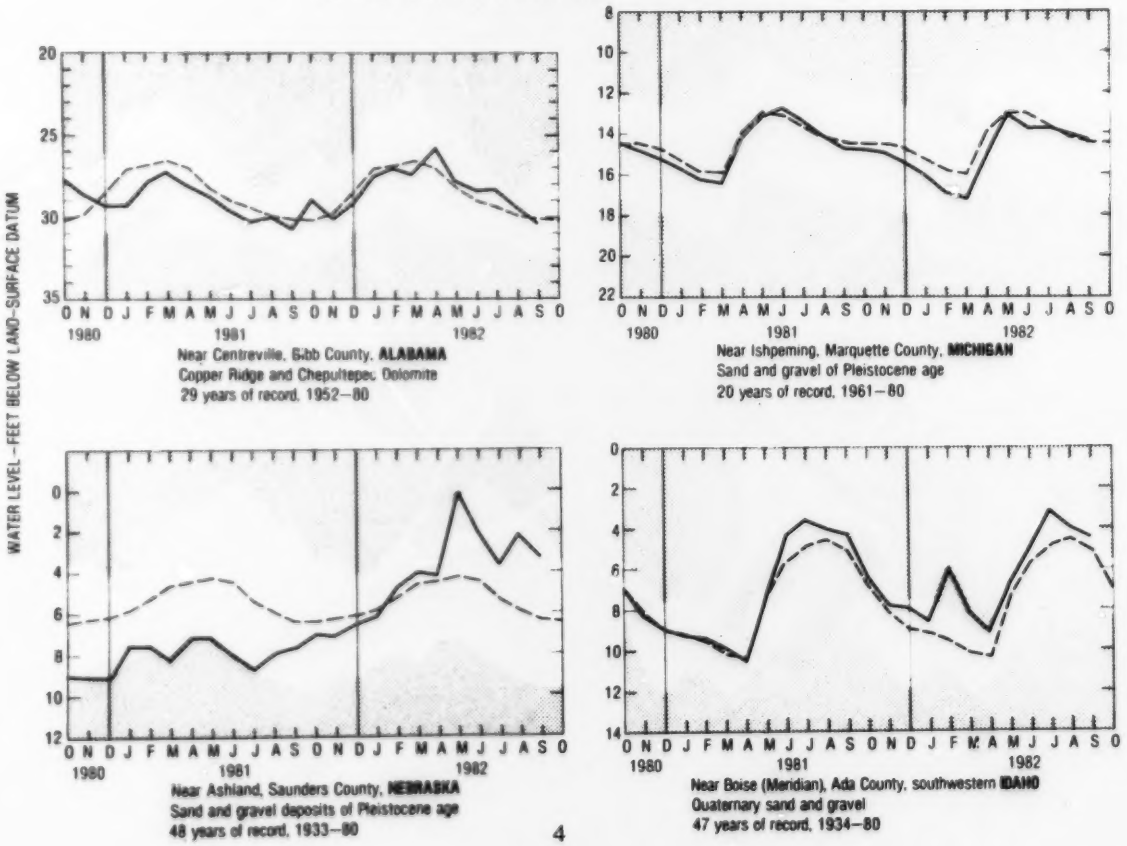
Among the Great Lakes States, including also Iowa, ground-water levels rose in Minnesota, changed little in Ohio, and were below average in Michigan, Iowa, and most of Wisconsin. Levels were above average in Iowa, near average in Wisconsin, and mixed with respect to average in other States.


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Within the normal range
Below normal (within the lowest 25 percent of range of water levels)
CHANGE IN GROUND-WATER STORAGE
Increase
Little or no change (water-level rise or fall less than 10 percent of difference between average and extreme high or low level)
Decrease

Map shows ground-water storage near end of September and change in ground-water storage from end of August to end of September.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DASHED LINE INDICATES AVERAGE OF MONTHLY LEVELS IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Centreville, Bibb County, **ALABAMA**
Copper Ridge and Chepultepec Dolomite
29 years of record, 1952–80

Near Ishpeming, Marquette County, **MICHIGAN**
Sand and gravel of Pleistocene age
20 years of record, 1961–80

Near Ashland, Saunders County, **NEBRASKA**
Sand and gravel deposits of Pleistocene age
48 years of record, 1933–80

Near Boise (Meridian), Ada County, southwestern **IDAHO**
Quaternary sand and gravel
47 years of record, 1934–80

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WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota (U.S. well no. 6)	-6.38	+1.75	+1.14	-0.95	1943	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan (U.S. well no. 1)	-5.00	+0.11	-0.15	+0.19	1935	
Glacial drift at Marion, Iowa (U.S. well no. 1)	-5.43	+1.12	-1.25	+0.29	1941	
Glacial drift at Princeton in northwestern Illinois (U.S. well no. 1)	-11.02	+2.73	-1.58	-1.30	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia (U.S. well no. 4)	-15.52	+0.57	-0.30	+1.76	1939	
Glacial outwash sand and gravel, Louisville, Kentucky (U.S. well no. 2)	-18.52	+7.38	-0.07	-0.57	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-104.02	-15.45	-0.02	-0.37	1941	September low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina (U.S. well no. 5)	-40.69	+2.12	-0.50	+4.39	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-230.20	-25.11	+2.70	+13.15	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-30.3	-0.3	-0.9	+0.4	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia (U.S. well no. 6)	-24.35	-6.04	+0.25	+1.15	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-105.48	+2.76	+0.60	+3.81	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	-457.6	+1.0	-0.1	+7.5	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	-122.6	-8.7	+1.1	-0.9	1957	September low.
Terrace gravel at Missoula, Montana	-15.30	-1.97	-1.50	-1.40	1960	September low.
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-3.30	+3.18	-1.13	+4.23	1935	
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-125.57	-7.62	+1.04	+1.68	1947	
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California (U.S. well no. 11)	-127.02	+19.72	-0.17	-7.48	1957	
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-67.62	-1.60	+0.74	-5.77	1966	
Hueco bolson, El Paso area, Texas	-260.76	-14.67	+2.51	-2.13	1965	September low.
Evangeline aquifer, Houston area, Texas	-328.68	-27.46	-3.55	-5.68	1965	Alltime low.

Among the western States, ground-water levels rose in Washington, rose in most of Idaho and Utah, and declined in North Dakota and in much of Nebraska and southern California. Trends were mixed in other States. Levels were above average in Washington, and below average in Arizona and in much of Idaho, Kansas, New Mexico, and Texas. Levels were above and below average elsewhere. New low ground-water levels for September were recorded in Idaho, Montana, Arizona, and Texas, and a new alltime low level was reached in Texas in 17 years of record.

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Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF SEPTEMBER 1982

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Sept. 1982	End of Sept. 1981	Average for end of Sept.	End of Aug. 1982	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	47	44	38	55	[b]226,300
QUEBEC					
Allard (P)	47	82	61	76	280,600
Gouin (P)	84	72	67	46	6,954,000
MAINE					
Seven reservoir systems (MP)	57	88	59	68	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	74	78	78	82	76,450
Lake Francis (FPR)	73	85	78	74	99,310
Lake Winnipesaukee (PR)	77	84	64	83	165,700
VERMONT					
Harriman (P)	67	66	64	73	116,200
Somerset (P)	65	57	72	70	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	80	70	74	83	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	57	72	62	71	786,700
Indian Lake (FMP)	84	88	59	89	103,300
New York City reservoir system (MW)	71	60	....	84	1,680,000
NEW JERSEY					
Wanaque (M)	81	54	68	89	85,100
PENNSYLVANIA					
Allegheny (FPR)	41	43	41	43	1,180,000
Pymatuning (FMR)	86	107	82	95	188,000
Raystown Lake (FR)	67	66	59	68	761,900
Lake Wallenpaupack (PR)	67	47	56	73	157,800
MARYLAND					
Baltimore municipal system (M)	73	75	86	78	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	92	89	83	94	288,800
Narrows (Badin Lake) (P)	92	93	98	92	128,900
High Rock Lake (P)	65	72	65	72	234,800
SOUTH CAROLINA					
Lake Murray (P)	85	83	67	87	1,614,000
Lakes Marion and Moultrie (P)	81	81	67	86	1,862,000
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	74	40	57	81	1,730,000
GEORGIA					
Burton (PR)	97	90	79	97	104,000
Sinclair (MPR)	89	79	81	87	214,000
Lake Sidney Lanier (FMPR)	57	41	54	61	1,686,000
ALABAMA					
Lake Martin (P)	92	87	77	95	1,373,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	44	36	37	36	2,229,300
Douglas Lake (FPR)	34	26	33	52	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	64	51	59	73	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	55	46	45	57	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	62	55	57	66	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	84	71	74	77	365,000
Wisconsin River (21 reservoirs) (PR)	87	50	63	73	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	33	33	32	35	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	92	75	91	92	22,700,000
SOUTH DAKOTA					
Angostura (I)	81	50	72	84	127,600
Belle Fourche (I)	....	19	31	57	185,200
Lake Francis Case (FIP)	79	68	68	77	4,834,000
Lake Oahe (FIP)	85	66	....	89	22,530,000
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	99	100	100	100	1,725,000
Lewis and Clarke Lake (FIP)	94	92	97	94	477,000
NEBRASKA					
Lake McConaughy (IP)	74	73	66	74	1,948,000
OKLAHOMA					
Eufaula (FPR)	80	77	81	83	2,378,000
Keystone (FPR)	86	84	93	91	661,000
Tenkiller Ferry (FPR)	90	89	90	94	628,200
Lake Altus (FIMR)	55	9	46	72	133,000
Lake O'The Cherokees (FPR)	84	88	81	86	1,492,000
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	92	82	92	95	2,722,000
TEXAS					
Bridgeport (IMW)	95	31	45	99	386,400
Canyon (FMR)	93	91	73	94	385,600
International Amistad (FIMPW)	90	100	84	93	3,497,000
International Falcon (FIMPW)	78	101	76	79	2,668,000
Livingston (IMW)	99	100	83	100	1,788,000
Possum Kingdom (IMPRW)	91	89	99	92	570,200
Red Bluff (PI)	14	16	24	14	307,000
Toledo Bend (P)	86	88	82	88	4,472,000
Twin Buttes (FIM)	39	36	32	43	177,800
Lake Kemp (IMW)	87	57	84	94	268,000
Lake Meredith (FWM)	48	36	41	47	796,900
Lake Travis (FIMPRW)	77	87	77	103	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	96	93	91	98	1,052,000
Franklin D. Roosevelt Lake (IP)	101	98	103	100	5,022,000
Lake Chelan (PR)	92	90	85	84	676,100
Lake Cushman (PR)	79	91	91	102	359,500
Lake Merwin (P)	99	98	93	104	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	67	45	47	75	1,235,000
Coeur d'Alene Lake (P)	79	76	64	98	238,500
Pend Oreille Lake (FP)	100	87	91	98	1,561,000
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	77	38	47	82	4,401,000
WYOMING					
Boysen (FIP)	100	89	84	100	802,000
Buffalo Bill (IP)	96	60	80	98	421,300
Keyhole (F)	28	22	45	29	190,400
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	50	40	43	54	3,056,000
COLORADO					
John Martin (FIR)	3	5	12	3	364,400
Taylor Park (IR)	81	52	59	84	106,200
Colorado–Big Thompson project (I)	59	49	58	33	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell: Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	92	81	....	92	31,620,000
UTAH--ID AHO					
Bear Lake (IPR)	88	62	59	91	1,421,000
CALIFORNIA					
Folsom (FIP)	78	62	59	87	1,000,000
Hetch Hetchy (MP)	92	62	58	98	360,400
Isabella (FIR)	65	30	27	74	568,100
Pine Flat (FI)	72	32	37	69	1,001,000
Clair Engle Lake (Lewiston) (P)	87	71	73	93	2,438,000
Lake Almanor (P)	90	69	52	97	1,036,000
Lake Berryessa (FIMW)	90	73	77	92	1,600,000
Millerton Lake (FI)	69	33	35	76	503,200
Shasta Lake (FIPR)	80	56	66	86	4,377,000
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	90	27	53	92	744,600
NEVADA					
Rye Patch (I)	74	36	54	92	194,300
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	87	83	72	86	27,970,000
ARIZONA					
San Carlos (IP)	8	24	14	9	1,073,000
Salt and Verde River system (IMPR)	66	53	36	68	2,073,000
NEW MEXICO					
Conchas (FIR)	73	47	83	74	330,100
Elephant Butte and Caballo (FIPR)	34	31	23	32	2,453,000

[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).
Correction on last month's report: Headings on 4th column of reservoir table should read "End of July 1982".

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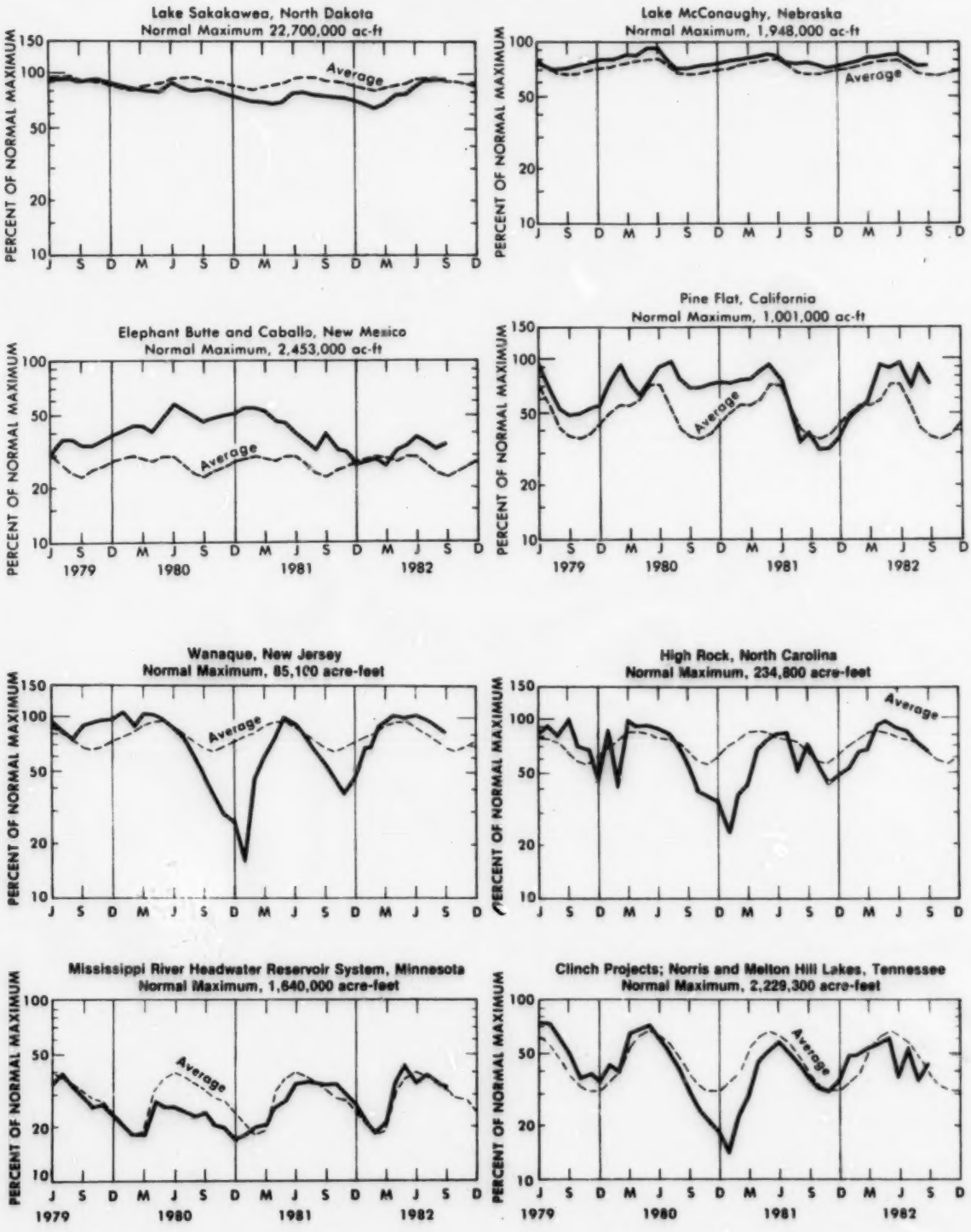
USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1979 TO SEPTEMBER 1982


Lake Sakakawea, North Dakota
Normal Maximum 22,700,000 ac-ft
Lake McConaughy, Nebraska
Normal Maximum, 1,948,000 ac-ft
Elephant Butte and Caballo, New Mexico
Normal Maximum, 2,453,000 ac-ft
Pine Flat, California
Normal Maximum, 1,001,000 ac-ft
Wanaque, New Jersey
Normal Maximum, 85,100 acre-feet
High Rock, North Carolina
Normal Maximum, 234,800 acre-feet
Mississippi River Headwater Reservoir System, Minnesota
Normal Maximum, 1,640,000 acre-feet
Clinch Projects; Norris and Melton Hill Lakes, Tennessee
Normal Maximum, 2,229,300 acre-feet
PERCENT OF NORMAL MAXIMUM
Average
J S D M J S D M J S D M J S D
1979
1980
1981
1982

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Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING SEPTEMBER 1982

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	September 1982					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from pervious month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	6,113	129	+127	5,770	3,729	30
01318500	Hudson River at Hadley, N.Y.	1,664	2,909	698	63	-4	1,400	900	30
01357500	Mohawk River at Cohoes, N.Y.	3,456	5,734	1,040	59	-3	980	633	30
01463500	Delaware River at Trenton, N.J.	6,780	11,750	4,390	102	-18	4,290	2,772	30
01570500	Susquehanna River at Harrisburg, Pa.	24,100	34,530	5,010	68	-34	7,560	4,886	28
01646500	Potomac River near Washington, D.C.	11,560	[1] 11,490	2,440	89	-42	3,040	1,964	30
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	1,070	59	-62	1,300	840	30
02131000	Pee Dee River at Peedee, S.C.	8,830	9,851	3,070	59	-50	3,770	2,436	29
02226000	Altamaha River at Doctortown, Ga.	13,600	13,880	4,215	84	-44	3,790	2,449	27
02320500	Suwannee River at Branford, Fla.	7,880	6,987	5,010	99	-30	4,610	2,979	30
02358000	Apalachicola River at Chattahoochee, Fla.	17,200	22,570	13,500	114	-37	12,500	8,080	30
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	23,300	2,620	68	-70	660	426	30
02489500	Pearl River near Bogalusa, La.	6,630	9,768	1,846	81	-67	1,740	1,124	30
03049500	Allegheny River at Natrona, Pa.	11,410	[1] 19,480	4,854	120	-9	5,300	3,430	24
03085000	Monongahela River at Braddock, Pa.	7,337	[1] 12,510	4,955	154	-7	4,550	2,940	22
03193000	Kanawha River at Kanawha Falls, W. Va.	8,367	12,590	4,100	121	-22	4,190	2,708	23
03234500	Scioto River at Higby, Ohio	5,131	4,547	801	76	-11	875	565	31
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	33,360	143	+6	23,700	15,320	26
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	12,862	188	+29	6,200	4,010	30
03469000	French Broad River below Douglas Dam, Tenn.	4,543	6,798	4,016	142	-39	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,163	2,015	94	-18	1,492	964	25
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	270,000	104	-3	267,000	172,600	30
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	14,700	79	+178	11,400	7,370	30
05082500	Red River of the North at Grand Forks, N. Dak.	30,100	2,551	1,260	102	-33	1,220	788	23
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	8,520	80	-43	7,500	4,850	29
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	1,633	171	+12	1,320	853	30
05331000	Mississippi River at St. Paul, Minn.	36,800	[1] 10,610	6,587	105	+16	6,800	4,390	30
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	6,284	196	+113	.....	.....	...
05407000	Wisconsin River at Muscoda, Wis.	10,300	8,617	7,105	121	+29	10,100	6,530	22
05446500	Rock River near Joslin, Ill.	9,551	5,873	3,920	132	-45	3,450	2,229	30
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	57,800	133	+6	37,100	23,980	30
06214500	Yellowstone River at Billings, Mont	11,796	7,038	5,949	132	-28	6,310	4,078	30
06934500	Missouri River at Hermann, Mo.	524,200	79,490	108,000	199	+4	90,100	58,230	27
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	421,800	151	-2	387,000	250,100	27
07331000	Washita River near Dickson, Okla.	7,202	1,368	354	91	-49	.....	.....	...
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex.	9,730	725	1,080	425	+42	1,250	807	30
09315000	Green River at Green River, Utah.	40,600	6,298	4,201	152	+13	4,230	2,733	24
11425500	Sacramento River at Verona, Calif.	21,257	18,820	22,310	184	+24	23,600	15,250	21
13269000	Snake River at Weiser, Idaho	69,200	18,050	16,100	121	+35	18,430	11,911	27
13317000	Salmon River at White Bird, Idaho	13,550	11,250	6,150	132	-35	6,920	4,472	27
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	2,644	85	-50	9,450	6,107	27
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	121,800	126	-27	107,800	69,670	27
14191000	Willamette River at Salem, Oreg.	7,280	23,510	5,786	145	+36	12,760	8,247	28
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	32,156	102	-32	23,000	14,900	30
8MF005	Fraser River at Hope, British Columbia	83,800	96,290	128,175	150	-26	91,453	59,107	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR SEPTEMBER AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	September data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at	1982	4,387	118	131	1,450	1,296	1,864	21.5	18.5	24.0
	Trenton, N.J.	1945–81	5,515	63	149	.....	523	6,700	.....	14.0	32.0
	(Morrisville, Pa.)	(Extreme yr)		(1977)	(1965)		(1966)	(1974)			
			[c]4,272								
04264331	St. Lawrence River at	1982	272,000	165	166	121,000	119,000	123,000	18.5	17.0	19.0
	Cornwall, Ontario, near	1975–81	288,900	164	175	130,000	120,000	142,000	19.0	15.0	22.5
	Massena, N.Y.	(Extreme yr)		(1980)	(1979)		(1977)	(1976)			
	median streamflow at		[c]259,400								
	Ogdensburg, N.Y.										
	SOUTHEAST										
0728900	Mississippi River at	1982	421,800	207	255	255,000	213,000	354,000	26.0	22.5	28.0
	Vicksburg, Miss.	1975–81	372,100	185	277	239,000	116,000	472,000	26.0	21.0	30.0
		(Extreme yr)		(1977)	(1981)		(1976)	(1979)			
			[c]286,450								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1982	146,000	*136	*200	.....	*25,100	*152,100	.....	21.5	26.5
	53, near Grand Chain, Ill.	1955–81	114,900	117	314	.....	9,190	304,000	.....	17.0	29.5
	(25 miles west of Paducah,	(Extreme yr)		(1965)	(1965)		(1961)	(1975)			
	Ky.; streamflow station		[c]89,720								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1982	104,000	213	404	90,900	67,200	158,000	22.5	19.5	25.5
	Mo. (60 miles west of St.	1975–81	74,480	204	521	74,000	46,900	154,000	23.0	18.0	28.0
	Louis, Mo.)	(Extreme yr)		(1977)	(1980)		(1976)	(1977)			
			[c]54,090								
	WEST										
14128910	Columbia River at	1982	123,000	80	85	27,600	20,000	38,700	19.5	17.0	21.0
	Warrendale, Oreg.	1975–81	117,000	73	102	29,300	16,800	50,300	19.0	17.0	21.5
	(streamflow station	(Extreme yr)		(1976)	(1977,79)		(1981)	(1976)			
	at The Dalles, Oreg.)		[c]97,120								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X°C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.
*Maximum and minimum values are for the first 27 days of the month.

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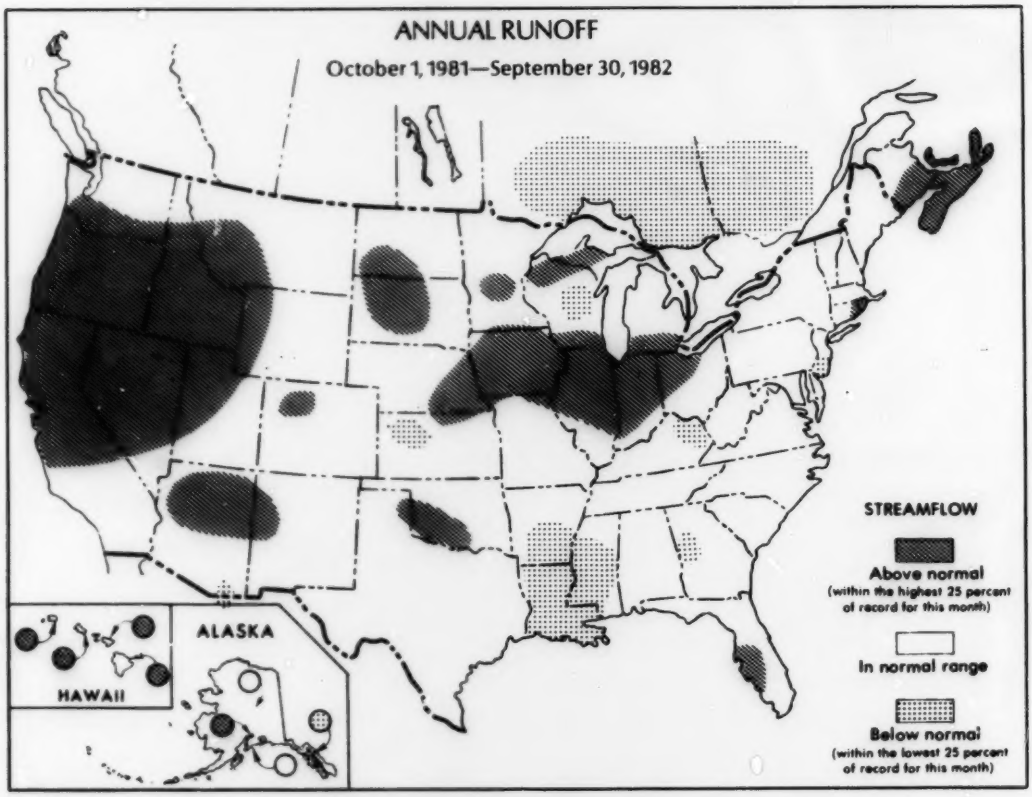

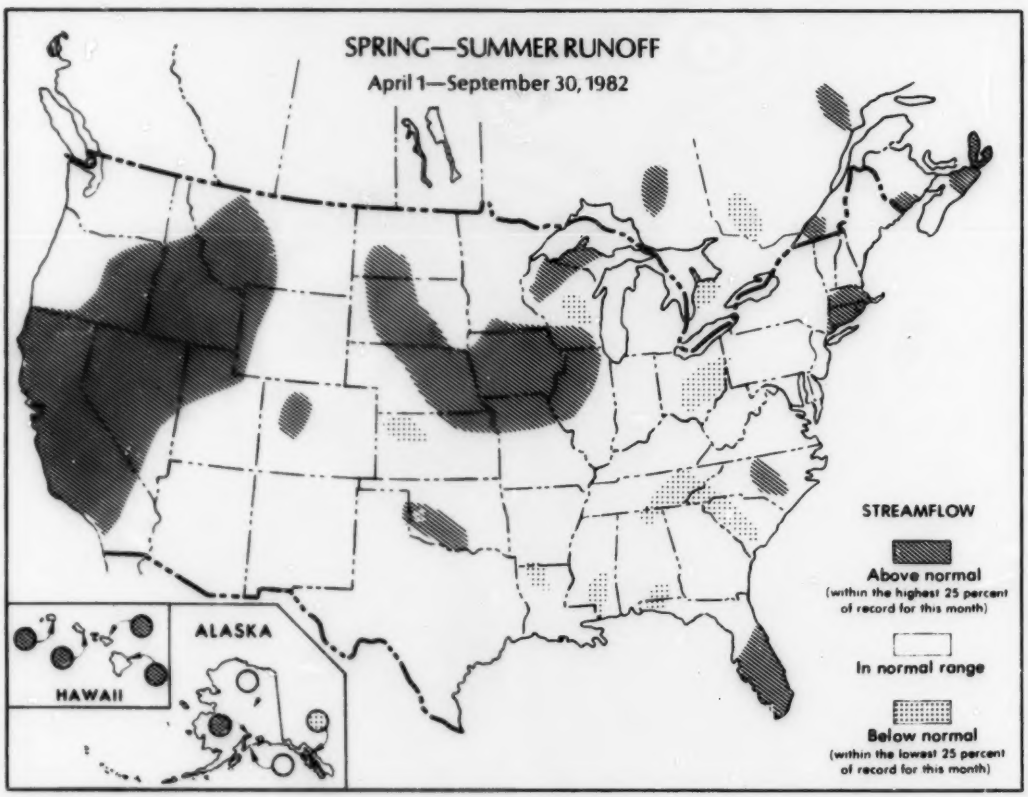

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NATIONAL WATER CONDITIONS

September 1982

Based on reports from the Canadian and U.S. Field offices; completed October 12, 1982

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and *164* index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for September are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

METRIC EQUIVALENTS OF UNITS USED IN THE NATIONAL WATER CONDITIONS

1 foot = 0.3048 meter

1 acre-foot = 1,233 cubic meters

1 million cubic feet = 28,320 cubic meters

1 cubic foot per second =
0.02832 cubic meters per second =
1.699 cubic meters per minute

1 cubic foot per second · day = 2,447 cubic meters

1 mile = 1.609 kilometers

1 square mile = 259 hectares = 2.59 square kilometers

1 million gallons = 3,785 cubic meters =
3.785 million liters

1 million gallons per day = 694.4 gallons per minute =
2.629 cubic meters per minute =
3,785 cubic meters per day

(Round-number conversions, to nearest four significant figures)

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National Water Conditions

(Formerly the Water Resources Review)

UNITED STATES
Department of the Interior
Geological Survey

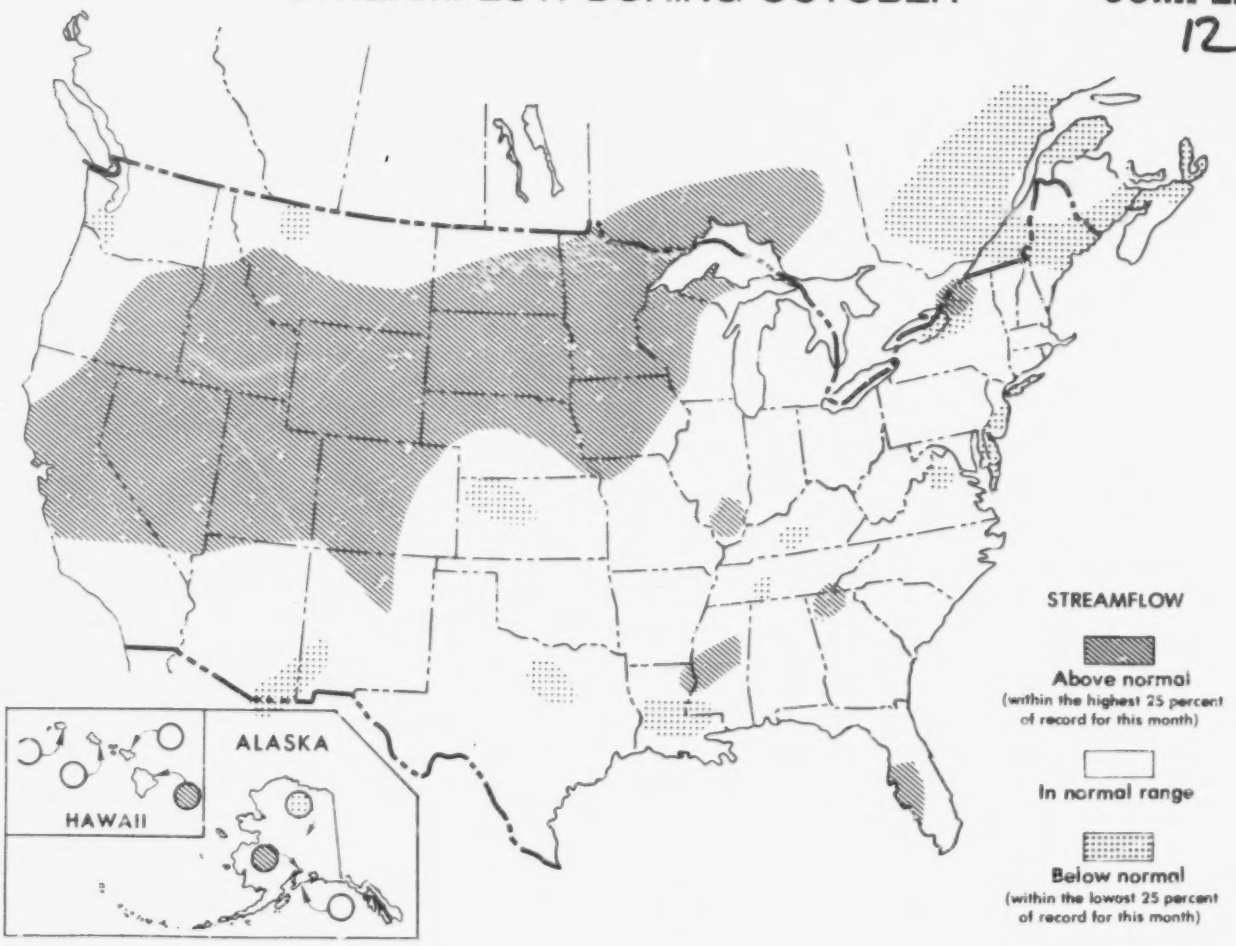
CANADA
Department of the Environment
Water Resources Branch

OCTOBER 1982

ORIGINAL

COMPLETED
12

STREAMFLOW DURING OCTOBER



Streamflow was in the normal range or above that range in most of the United States and southern Canada during October. A large area of below-normal flow developed in southeastern Canada and smaller areas in several States also experienced low flows.

Monthly mean flows were highest of record for the month in parts of a large area of above-normal streamflow that extended from south-central Ontario southwest to central California. Mean flows were lowest of record for the month in parts of Louisiana.

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STREAMFLOW CONDITIONS DURING OCTOBER 1982

High carryover flow from September augmented by runoff from heavy rains during October caused streamflow to remain in the above-normal range in a large area that extended from south-central Ontario southwest to central California. Monthly mean flows at index stations generally increased and were highest of record for October in parts of Ontario, Iowa, Nebraska, South Dakota, Utah, Nevada, Idaho, Oregon, and California. The most dramatic increase in flow was on the Bad River near Fort Pierre, South Dakota (drainage area, 3,107 square miles) where the monthly mean discharge of 289 cubic feet per second (cfs) was about 15,000 times the median flow for the month and highest for October in 54 years of record. The table at the bottom of page 3 lists the maximum monthly and daily mean flows for period of record at streamflow index stations where new monthly and/or daily mean flows were established during October 1982. Typical of the persistent pattern of the above-normal trend in streamflow was the flow of Humboldt River at Palisade, Nevada (drainage area, 5,010 square miles) which was more than 9 times the median flow. The monthly mean discharge of 356 cfs and the daily mean flow of 516 cfs on October 2 were highest for the month in 75 years of record and marked the second consecutive month of record high flows and the fourth consecutive month of flows in the above-normal range at that site. (See graph on page 3.) By contrast, in southeastern Louisiana, the monthly mean discharge of 293 cfs and the daily mean discharge of 210 cfs on October 22 at Amite River near Denham Springs (drainage area, 1,280 square miles) were lowest for October in period of record that began in 1938.

A large area of below-normal streamflow (within the lowest 25 percent of record) developed in southeastern Canada during October and parts of Maine, New York, New Jersey and Delaware also experienced low flows. For example, in the Delmarva peninsula, monthly mean flow of Choptank River near Greensboro, Maryland increased seasonally to 59 percent of median but remained in the below-normal range for the second consecutive month. Similarly, in southwestern Quebec, mean flow for October at Harricana River at Amos continued to increase seasonally but remained in the below-normal range for the fourth consecutive month. Elsewhere in southern Canada and in eastern and southern sections of the United States, flows were generally within the normal range.

High tides and runoff from heavy rains caused some severe flooding in coastal areas from North Carolina to New Jersey during the last week in October. Localized flooding also occurred in Yazoo and Big Black River basins in Mississippi, on Bayou Macon in northeastern Louisiana, and runoff from heavy thunderstorms produced bankfull stages on a number of Elkhorn River tributaries in east-central Nebraska on October 9–10. For example, in northeastern Louisiana, runoff from heavy rains—over 17 inches during the first 12 days of October at Lake Providence—caused flow to increase sharply at Bayou Macon near Delhi (drainage area, 782 square miles) and the peak discharge of 7,300 cfs on October 14 was highest for October in 58 years of record.

The combined flow of three large rivers—Mississippi, St. Lawrence, and Columbia—averaged 687,300 cfs during October, which was 111 percent of the long-term median for the month, but was within the normal range, following four consecutive months of flow in the above-normal range. Individual flows at the Mississippi River at Vicksburg, Mississippi, the Columbia River at The Dalles, Oregon, and the St. Lawrence River at Cornwall, Ontario—near Massena, New York have been above median for 5, 6, and 16 consecutive months at the respective sites. Because these three large rivers account for about half the runoff in the conterminous 48 States, the combined flow provide a quick check on the status of the Nation's water resources.

Reservoir contents were below average in parts of Quebec, New Hampshire, Vermont, New York, Maryland, Oklahoma, and Texas and generally near or above average elsewhere. For example, the combined contents of 10 index reservoirs in northern and central California were 123 percent of average at month's end and were 126 percent of the contents of one year ago.

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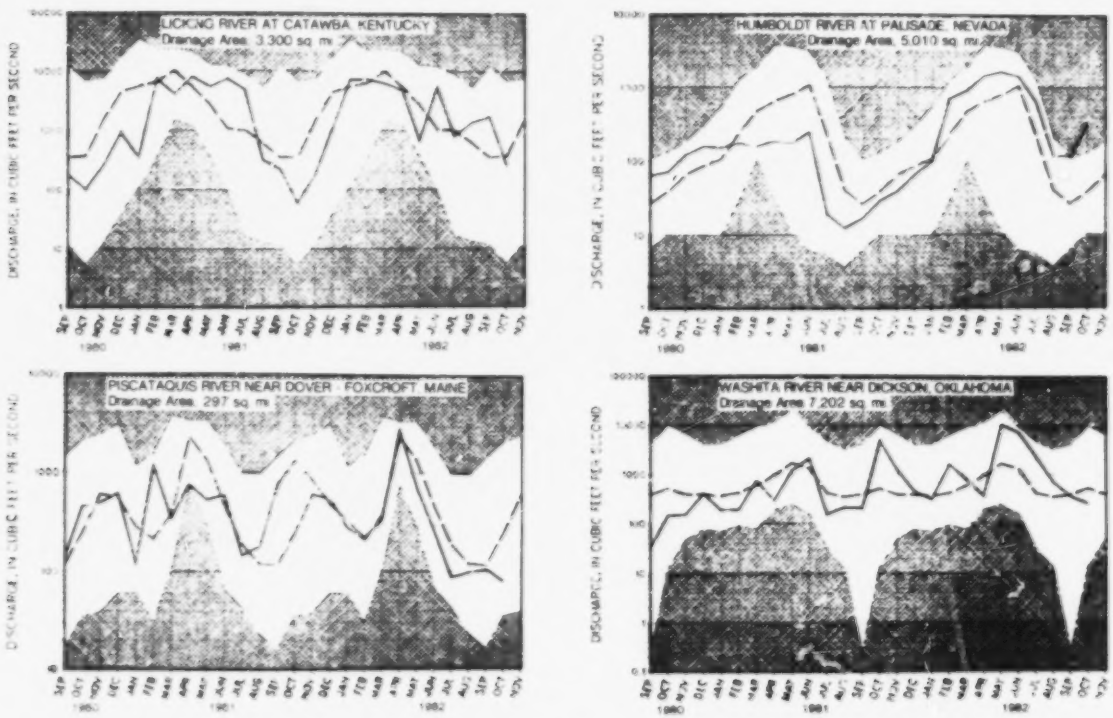
SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.


LICKING RIVER AT CATAWBA, KENTUCKY
Drainage Area, 3,300 sq. mi.
HUMBOLDT RIVER AT PALISADE, NEVADA
Drainage Area, 5,010 sq. mi.
PISCATAQUIS RIVER NEAR DOVER - FOXCROFT, MAINE
Drainage Area, 297 sq. mi.
WASHITA RIVER NEAR DICKSON, OKLAHOMA
Drainage Area, 7,202 sq. mi.
1980
1981
1982

NEW EXTREMES DURING OCTOBER 1982 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (sq mi)	Years of record	Maximum October means (period of record)		October 1982			
				Monthly mean in cfs (year)	Daily mean in cfs (year)	Monthly mean in cfs	Percent of median	Daily mean in cfs	Day
04LJ001	Missinaibi River at Mattice, Ontario.	3,450	62	8,828 (1966)	21,963 (1979)	9,640	314	.....	.....
05480500	Des Moines River at Fort Dodge, Iowa.	4,190	51	3,160 (1969)	6,690 (1966)	4,270	1,234	5,750	5
06441500	Bad River near Fort Pierre, South Dakota.	3,107	54	226 (1942)	2,960 (1952)	289	1,445,000	.....	....
06485500	Big Sioux River at Akron, Iowa.	9,030	54	922 (1978)	2,920 (1978)	2,280	954	4,580	12
06800500	Elkhorn River at Waterloo, Nebraska.	6,900	63	2,347 (1952)	15,200 (1966)	2,440	478	12,300	10
09315000	Green River at Green River, Utah.	40,600	83	5,169 (1942)	12,000 (1929)	[1]9,555	264	.....	.....
10126500	Weber River near Oakley, Utah.	163	78	141 (1914)	208 (1926)	207	304	286	1
10296000	West Walker River below Little Walker River, near Coleville, Calif.	180	44	109 (1939)	626 (1946)	211	441	730	26
10322500	Humboldt River at Palisade, Nevada.	5,010	75	135 (1905)	179 (1976)	356	910	516	2
13037500	Snake River near Heise, Idaho. . .	5,752	72	[1]5,335 (1973)	.....	[1]5,540	148	.....	....
14046500	John Day River at Service Creek, Oregon.	5,090	54	636 (1958)	1,530 (1963)	687	207	.....	....

[1] Adjusted.

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GROUND-WATER CONDITIONS DURING OCTOBER 1982

Ground-water levels continued to decline in eastern and southern parts of New England and in Maryland, Delaware, New Jersey, and eastern Pennsylvania. Levels at the end of October were near average for this time of year in most of the region. Local exceptions included below-average levels in parts of Maryland, Delaware, New Jersey, and northern New England. New October low levels were reported for four wells in Maine.

In the southeastern States, ground-water levels generally declined in Kentucky, Virginia, and Mississippi, and rose or held steady in Alabama; trends were mixed in other States. Levels were above average in North Carolina and in most of Kentucky, and were below average in West Virginia, Virginia, Lousiana Arkansas, Alabama, and Florida. A new October low occurred in Tennessee.

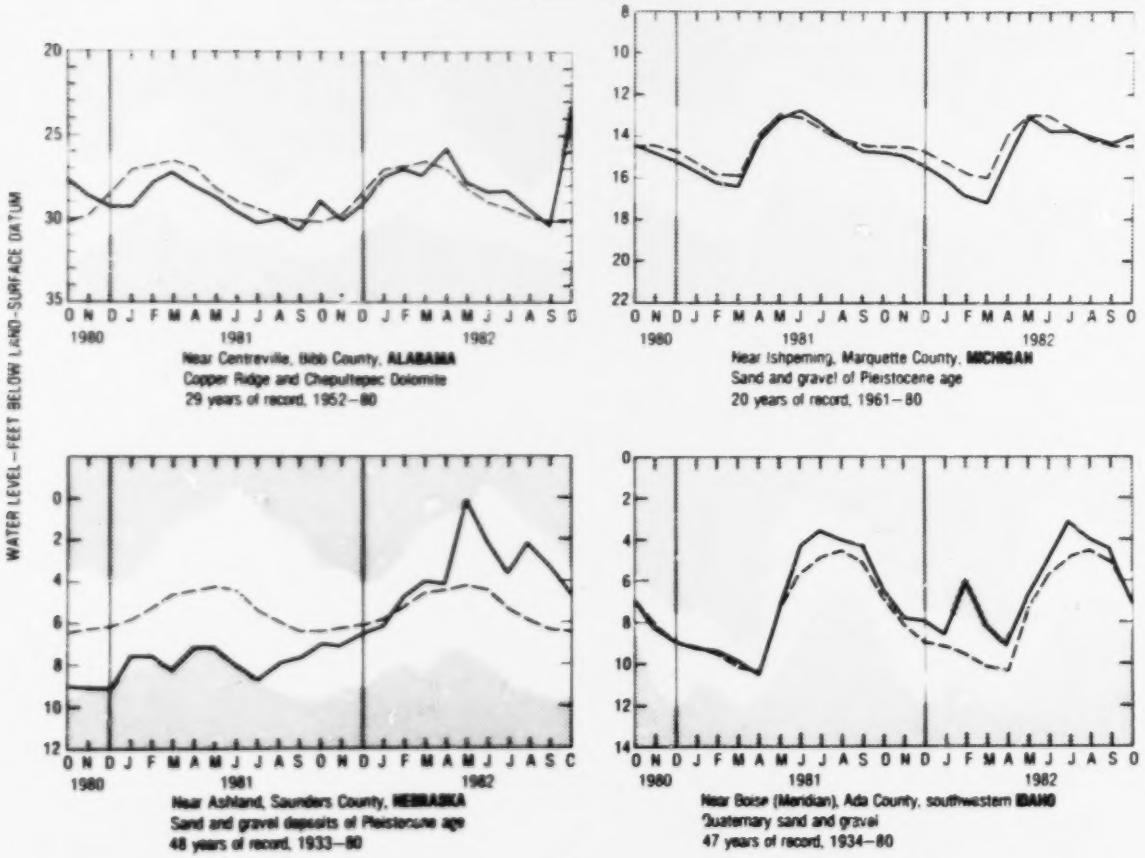
Among the Great Lakes States, including also Iowa, ground-water levels rose in Minnesota and declined in Indiana; trends were mixed in other States. Levels were above average in Minnesota, Iowa, and mixed with respect to average elsewhere. A new October high level was recorded in Iowa.

STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Within the normal range
Below normal (within the lowest 25 percent of range of water levels)
CHANGE IN GROUND-WATER STORAGE
Increase
Little or no change (water-level rise or fall less than 10 percent of difference between average and extreme high or low level)
Decrease

Map shows ground-water storage near end of October and change in ground-water storage from end of September to end of October.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DASHED LINE INDICATES AVERAGE OF MONTHLY LEVELS IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Centreville, Bibb County, **ALABAMA**
Copper Ridge and Chepultepec Dolomite
29 years of record, 1952–80

Near Ishpeming, Marquette County, **MICHIGAN**
Sand and gravel of Pleistocene age
20 years of record, 1961–80

Near Ashland, Saunders County, **NEBRASKA**
Sand and gravel deposits of Pleistocene age
48 years of record, 1933–80

Near Boise (Meridian), Ada County, southwestern **IDAHO**
Quaternary sand and gravel
47 years of record, 1934–80

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WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES—OCTOBER 1982

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota	-5.07	+3.64	+1.31	-0.22	1943	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan	-4.75	+0.28	+0.25	+0.48	1935	
Glacial drift at Marion, Iowa	-6.18	+0.76	-0.75	-2.54	1941	
Glacial drift at Princeton in northwestern Illinois	-11.72	+2.79	-0.70	-4.74	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia	-16.77	-0.50	-1.25	+0.87	1939	
Glacial outwash sand and gravel, Louisville, Kentucky	-18.80	+7.26	-0.28	-0.65	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-103.69	-15.41	+0.33	-0.07	1941	October low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina	-41.56	+1.59	-0.83	+3.82	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-235.55	-33.16	-5.35	+7.50	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-30.3	-0.2	0	-1.4	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia	-23.45	-5.36	+0.90	+1.95	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-104.88	+1.41	+0.60	+2.25	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	-457.4	+2.3	+0.2	+7.3	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	-122.5	-8.5	+0.1	+0.7	1957	
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-4.06	+2.54	-0.76	+3.63	1935	
Alluvial valley fill in Steptoe Valley, Nevada	-11.04	+2.57	+0.50	+0.68	1950	October high.
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-125.02	-7.75	+0.55	-0.30	1947	
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California	-127.95	+18.64	-0.93	+0.91	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	-113.3	-25.97	+1.7	-1.2	1951	
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-62.03	-0.21	+1.44	+3.09	1966	
Hueco bolson, El Paso area, Texas	-260.56	-15.94	+0.20	-2.48	1965	October low.
Evangeline aquifer, Houston area, Texas	-331.20	-29.79	-2.52	-6.94	1965	Alltime low.

Among the western States, ground-water levels rose in North Dakota and in most of Idaho, Nebraska, and Utah, and declined in much of Kansas. Trends were mixed in other States. Water levels were above average in Washington, North Dakota, and Nebraska, below average in Arizona, and mixed with respect to average in other States. A new high ground-water level for October was reached in Nevada, and new lows for October occurred in Idaho, Arizona, and Texas. A new alltime low level was reached in Texas in 18 years of record.

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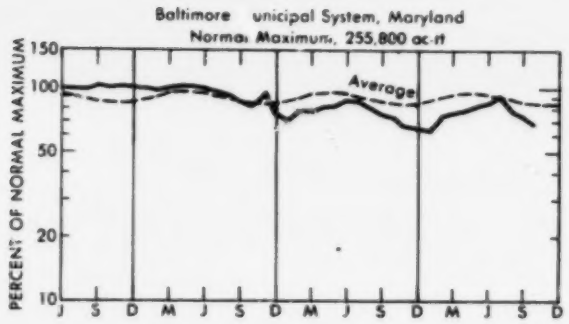
USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF OCTOBER 1982

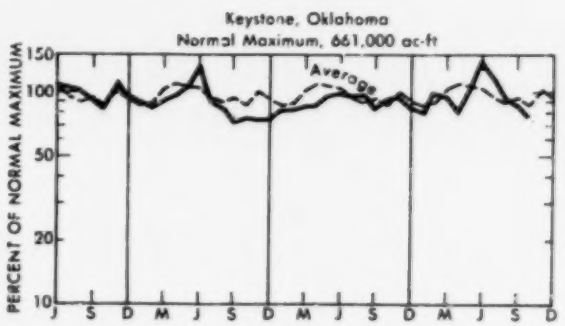
[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

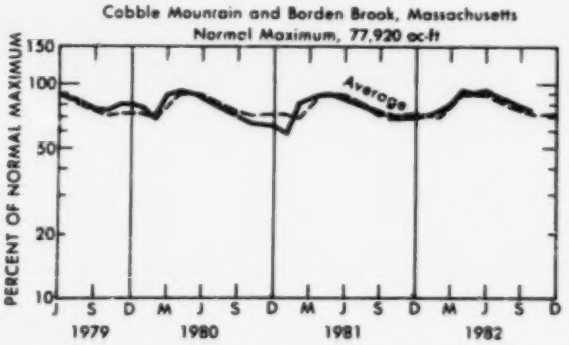
Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Oct. 1982	End of Oct. 1981	Average for end of Oct.	End of Sept. 1982	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	38	40	35	47	[b]226,300
QUEBEC					
Allard (P)	83	85	59	47	280,600
Gouin (P)	49	66	68	84	6,954,000
MAINE					
Seven reservoir systems (MP)	45	95	54	57	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	67	79	74	74	76,450
Lake Francis (FPR)	71	89	77	72	99,310
Lake Winnipesaukee (PR)	66	97	56	77	165,700
VERMONT					
Harriman (P)	63	79	61	67	116,200
Somerset (P)	66	65	69	65	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	76	69	71	80	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	47	87	54	57	786,700
Indian Lake (FMP)	73	84	55	84	103,300
New York City reservoir system (MW)	59	60	...	71	1,680,000
NEW JERSEY					
Wanaque (M)	71	46	63	81	85,100
PENNSYLVANIA					
Allegheny (FPR)	38	44	33	41	1,180,000
Pymatuning (FMR)	87	93	78	86	188,000
Raystown Lake (FR)	66	66	51	67	761,900
Lake Wallenpaupack (PR)	63	47	48	67	157,800
MARYLAND					
Baltimore municipal system (M)	68	71	84	73	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	90	85	81	92	288,800
Narrows (Badin Lake) (P)	90	84	95	92	128,900
High Rock Lake (P)	58	54	58	65	234,800
SOUTH CAROLINA					
Lake Murray (P)	82	80	62	85	1,614,000
Lakes Marion and Moultrie (P)	83	79	65	81	1,862,000
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	66	35	54	74	1,730,000
GEORGIA					
Burton (PR)	93	90	66	97	104,000
Sinclair (MPR)	72	76	76	89	214,000
Lake Sidney Lanier (FMPR)	58	34	51	57	1,686,000
ALABAMA					
Lake Martin (P)	88	83	67	92	1,373,000
TENNESSEE VALLEY					
Cinch Projects: Norris and Melton Hill Lakes (FPR)	34	32	33	44	2,229,300
Douglas Lake (FPR)	23	19	23	34	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	56	45	49	64	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	49	39	39	55	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	54	45	48	62	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	94	87	77	84	365,000
Wisconsin River (21 reservoirs) (PR)	95	62	63	87	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	34	34	29	33	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	92	75	89	92	22,700,000
SOUTH DAKOTA					
Angostura (I)	85	51	72	81	127,600
Belle Fourche (I)	72	24	35	...	185,200
Lake Francis Case (FIP)	68	52	57	79	4,834,000
Lake Oahe (FIP)	85	64	...	85	22,530,000
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	101	100	94	99	1,725,000
Lewis and Clarke Lake (FIP)	92	94	95	94	477,000
NEBRASKA					
Lake McConaughy (IP)	78	76	67	74	1,948,000
OKLAHOMA					
Eufaula (FPR)	78	104	84	80	2,378,000
Keystone (FPR)	74	92	86	86	661,000
Tenkiller Ferry (FPR)	88	96	89	90	628,200
Lake Altus (FIMR)	53	8	47	55	133,000
Lake O'The Cherokees (FPR)	82	92	81	84	1,492,000
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	89	138	93	92	2,722,000
TEXAS					
Bridgeport (IMW)	91	101	45	95	386,400
Canyon (FMR)	92	70	72	93	385,600
International Amistad (FIMPW)	89	109	87	90	3,497,000
International Falcon (FIMPW)	75	100	79	78	2,668,000
Livingston (IMW)	100	102	79	99	1,788,000
Possum Kingdom (IMPRW)	90	98	101	91	570,200
Red Bluff (PI)	14	16	27	14	307,000
Toledo Bend (P)	85	88	77	86	4,472,000
Twin Buttes (FIM)	37	42	31	39	177,800
Lake Kemp (IMW)	80	59	85	87	268,000
Lake Meredith (FWM)	49	37	38	48	796,900
Lake Travis (FIMPRW)	76	101	80	77	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	93	91	85	96	1,052,000
Franklin D. Roosevelt Lake (IP)	100	99	102	101	5,022,000
Lake Chelan (PR)	81	83	73	92	676,100
Lake Cushman (PR)	64	87	86	79	359,500
Lake Merwin (P)	104	99	86	99	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	61	46	47	67	1,235,000
Coeur d'Alene Lake (P)	62	60	54	79	238,500
Pend Oreille Lake (FP)	81	59	70	100	1,561,000
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	80	35	49	77	4,401,000
WYOMING					
Boysen (FIP)	98	87	82	100	802,000
Buffalo Bill (IP)	96	54	74	96	421,300
Keyhole (F)	25	21	43	28	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	52	40	43	50	3,056,000
COLORADO					
John Martin (FIR)	4	4	10	3	364,400
Taylor Park (IR)	68	46	53	81	106,200
Colorado–Big Thompson project (I)	56	44	54	59	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	92	81	...	92	31,620,000
UTAH--IDAHO					
Bear Lake (IPR)	87	61	58	88	1,421,000
CALIFORNIA					
Folsom (FIP)	74	56	53	76	1,000,000
Hetch Hetchy (MP)	92	51	48	92	360,400
Isabella (FIR)	57	30	23	65	568,100
Pine Flat (FI)	71	34	37	72	1,001,000
Clair Engle Lake (Lewiston) (P)	84	68	68	87	2,438,000
Lake Almanor (P)	87	66	49	90	1,036,000
Lake Berryessa (FIMW)	71	72	73	90	1,600,000
Millerton Lake (FI)	68	35	32	69	503,200
Shasta Lake (FIPR)	78	58	63	80	4,377,000
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	90	21	48	90	744,600
NEVADA					
Rye Patch (I)	71	31	50	74	194,300
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	87	84	70	87	27,970,000
ARIZONA					
San Carlos (IP)	8	26	14	8	1,073,000
Salt and Verde River system (IMPR)	65	54	35	66	2,073,000
NEW MEXICO					
Conchas (FIR)	72	46	80	73	330,100
Elephant Butte and Caballo (FIPR)	35	32	26	34	2,453,000

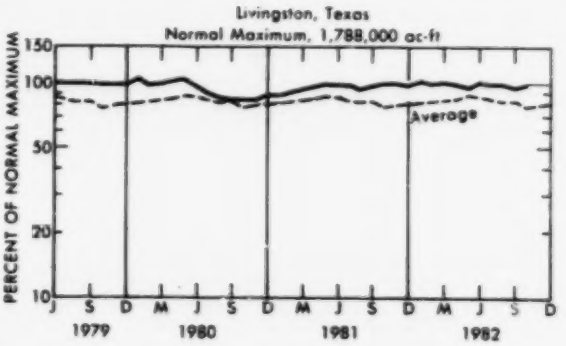
[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

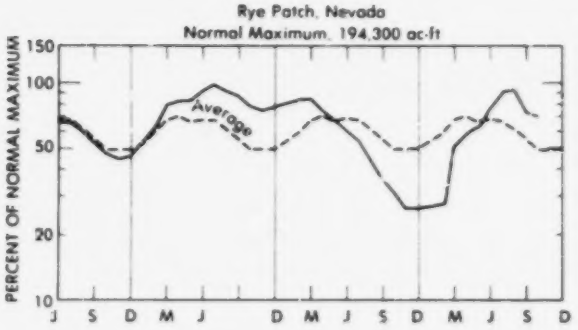
USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1979 TO OCTOBER 1982

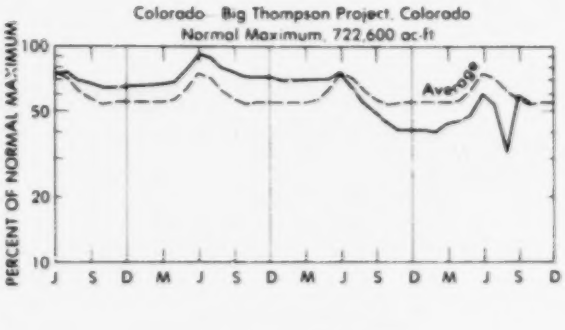


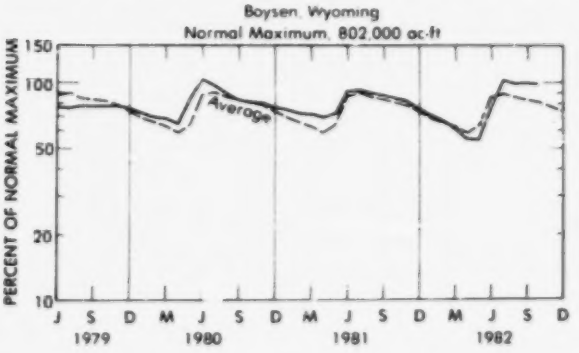


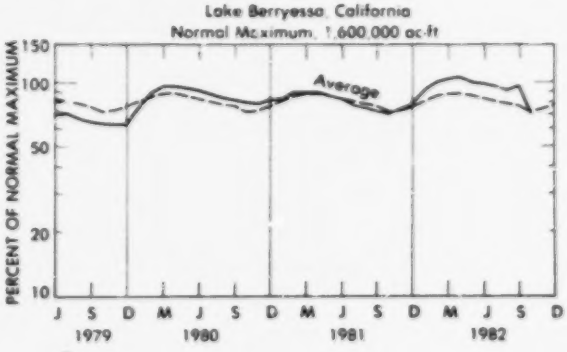












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FLOW OF LARGE RIVERS DURING OCTOBER 1982

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	October 1982					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from pervious month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	4,339	90	-29	2,450	1,583	31
01318500	Hudson River at Hadley, N.Y	1,664	2,909	1,270	90	+82	1,000	600	31
01357500	Mohawk River at Cohoes, N.Y	3,456	5,734	1,110	42	+7	900	580	31
01463500	Delaware River at Trenton, N.J	6,780	11,750	4,188	85	-5	4,080	2,636	31
01570500	Susquehanna River at Harrisburg, Pa	24,100	34,530	4,920	46	-2	4,380	2,830	25
01646500	Potomac River near Washington, D.C.	11,560	[1]11,490	2,570	90	+5	2,700	1,750	31
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	1,560	78	+46	1,800	1,160	29
02131000	Pee Dee River at Peedee, S.C	8,830	9,851	4,480	96	+46	13,300	8,600	28
02226000	Altamaha River at Doctortown, Ga.	13,600	13,880	4,366	84	+4	5,230	3,380	28
02320500	Suwannee River at Branford, Fla	7,880	6,987	3,490	76	-30	3,060	1,977	31
02358000	Apalachicola River at Chattahoochee, Fla	17,200	22,570	12,600	115	-7	12,500	8,080	
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	23,300	3,180	81	+21	1,050	678	29
02489500	Pearl River near Bogalusa, La	6,630	9,768	3,381	159	+83	3,710	2,397	31
03049500	Allegheny River at Natrona, Pa	11,410	[1]19,480	4,492	63	-7	4,780	3,089	25
03085000	Monongahela River at Braddock, Pa.	7,337	[1]12,510	4,118	106	-17	2,750	1,777	25
03193000	Kanawha River at Kanawha Falls, W. Va	8,367	12,590	5,380	88	+31	4,380	2,830	26
03234500	Scioto River at Higby, Ohio	5,131	4,547	795	104	-1	792	511	28
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	26,090	73	-22	19,000	12,300	25
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	8,762	126	-32	7,220	4,666	27
03469000	French Broad River below Douglas Dam, Tenn	4,543	6,798	3,235	86	-19	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[4]	6,150	4,163	2,363	106	+17	3,654	2,361	28
04264331	St. Lawrence River at Cornwall, Ontario near Massena, N.Y[3]	299,000	242,700	265,200	104	-2	263,000	170,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	13,400	70	-9	19,800	12,800	29
05082500	Red River of the North at Grand Forks, N. Dak	30,100	2,551	3,530	261	+180	4,060	2,624	24
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	20,300	186	+138	23,600	15,250	26
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	4,152	395	+154	5,300	3,430	31
05331000	Mississippi River at St. Paul, Minn	36,800	[1]10,610	17,544	268	+166	18,000	11,600	31
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	11,098	400	+77	23,900	15,450	22
05407000	Wisconsin River at Muscoda, Wis	10,300	8,617	11,156	205	+57	21,750	14,057	25
05446500	Rock River near Joslin, Ill	9,551	5,873	4,400	133	+12	4,200	2,710	31
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	73,650	208	+27	111,100	71,810	31
06214500	Yellowstone River at Billings, Mont	11,796	7,038	5,703	135	-4	5,150	3,328	31
06934500	Missouri River at Hermann, Mo	524,200	79,490	72,710	120	-33	65,700	42,460	31
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	325,700	111	-23	338,000	218,500	25
07331000	Washita River near Dickson, Okla	7,202	1,368	253	48	-29	213	137	27
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	725	758	273	-30	465	300	31
09315000	Green River at Green River, Utah	40,600	6,298	7,555	263	+80	8,400	5,430	20
11425500	Sacramento River at Verona, Calif	21,257	18,820	16,316	153	-27	.....	.....	...
13269000	Snake River at Weiser, Idaho	69,200	18,050	19,500	133	+21	20,900	13,510	26
13317000	Salmon River at White Bird, Idaho	13,550	11,250	7,540	151	+23	9,920	6,411	27
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	4,900	121	+85	7,110	4,595	27
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	96,400	105	-21	141,000	91,100	27
14191000	Willamette River at Salem, Oreg.	7,280	23,510	7,170	103	+24	19,400	12,540	27
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	15,074	97	-53	10,800	6,980	31
8MF005	Fraser River at Hope, British Columbia	83,800	96,290	80,860	110	-37	75,917	49,066	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

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Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR OCTOBER AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	October data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1982	4,091	108	132	1,281	483	1,665	16.0	10.0	21.0
		1945–81 (Extreme yr)	6,786	58 (1945)	156 (1953)	.....	463 (1963)	8,300 (1955)	.....	8.5	25.5
			[c]4,918								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. median streamflow at	1982	265,000	164	165	118,000	115,000	120,000	14.0	9.5	17.0
		1975–81 (Extreme yr)	291,700	164 (1981)	168 (1975–77)	130,000	115,000 (1978)	138,000 (1977)	13.0	0	17.0
			[c]253,600								
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1982	325,700	183	284	213,000	169,000	252,000	20.5	15.5	24.0
		1975–81 (Extreme yr)	373,000	183 (1979)	309 (1981)	231,000	117,000 (1976)	356,000 (1979)	20.[illegible]	15.0	26.0
			[c]272,050								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	1982	*89,800	.....	.....	.....	.....	.....	.....	.....	.....
		1955–81 (Extreme yr)	120,800	135 (1960, 63)	330 (1967)	.....	15,000 (1973)	262,000 (1976)	.....	12.0	26.0
			[c]96,680								
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1982	72,700	370	482	86,300	72,800	116,000	17.0	11.5	22.0
		1975–81 (Extreme yr)	62,100	236 (1977)	558 (1980)	70,400	51,800 (1976)	142,000 (1975)	16.0	10.0	22.5
			[c]60,140								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1982	119,000	85	100	30,300	19,100	42,200	15.5	14.0	16.5
		1975–81 (Extreme yr)	116,000	73 (1981)	117 (1977)	30,100	13,200 (1981)	48,900 (1975)	16.0	13.0	19.5
			[c]91,570								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30 year reference period, water years 1951–80, for comparison with data for current month.
*Maximum and minimum dissolved-solids and water-temperature records not available.

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HYDROGEOLOGY AND RESULTS OF INJECTION TESTS AT WASTE-INJECTION TEST SITES IN PINELLAS COUNTY, FLORIDA

The abstract and illustrations below are from the report, *Hydrogeology and results of injection tests at waste-injection test sites in Pinellas County, Florida*, by John J. Hickey, U.S. Geological Survey Water Supply Paper 2183, 42 pages, 1982. This report may be purchased for $6.00 from Eastern Distribution Branch, U.S. Geological Survey, 604 S. Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

Potential benefits or hazards to freshwater resources could result from subsurface injection of treated waste-water. Recognizing this, the U.S. Geological Survey, in cooperation with Pinellas County and the city of St. Petersburg, undertook an evaluation of the hydrogeology and injection of wastewater at proposed test sites on the Pinellas peninsula. (See figure 1.)

The injection sites are underlain by sedimentary rocks ranging in age from Cretaceous to Pleistocene. Lower Eocene carbonate rocks were penetrated to a maximum depth of 3,504 feet and were found to have relatively low water yields. The most permeable part of the investigated section was in rocks of middle Eocene age within the Floridan aquifer.

At the injection sites, the Floridan aquifer was subdivided into four permeable zones and three semiconfining beds. The test injection zone is within the Avon Park Limestone, the most productive of the identified permeable zones, with a transmissivity of about 1,000,000 feet squared per day. Two semiconfining beds are above the injection zone in the Suwannee Limestone and Ocala Limestone and have vertical hydraulic conductivities estimated to range from about 0.1 to 1 foot per day where these beds do not contain clay.

Limited fresh ground-water supplies exist in the Floridan aquifer within the Pinellas peninsula. At all test sites, chloride concentration in the injection zone ranged from 19,000 to 20,000 milligrams per liter. (See figure 2.)

Injection tests ranging in duration from 3 to 91.1 days were run at three different sites. Pressure buildup occurred in permeable zones above and below the injection zone during these tests. Calculated pressure buildup in observation wells close to and at some distance from the test wells was typically less than 1 pound per square inch. Injection and formation water will probably move slowly through the semiconfining bed overlying the injection zone, and long-term injection tests will be needed to determine the effectiveness of these beds to retard flow. The injected water was well mixed with the native formation water, which, in part, is a direct consequence of the fractures in the injection zone.

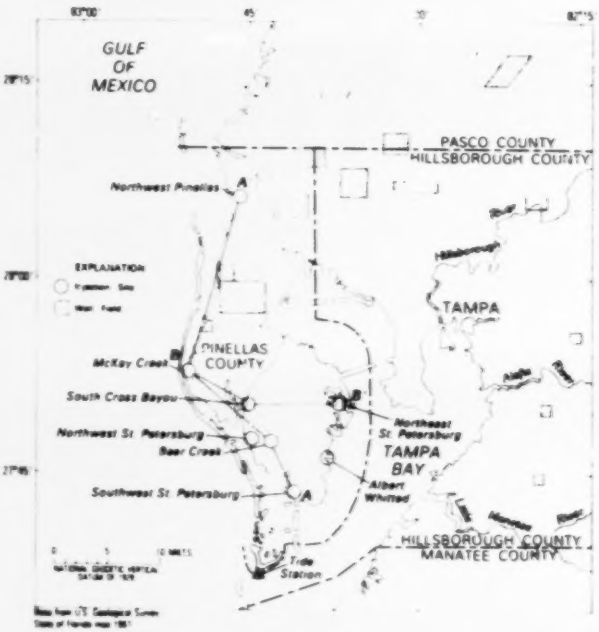

Figure 1.—Location of test injection sites.

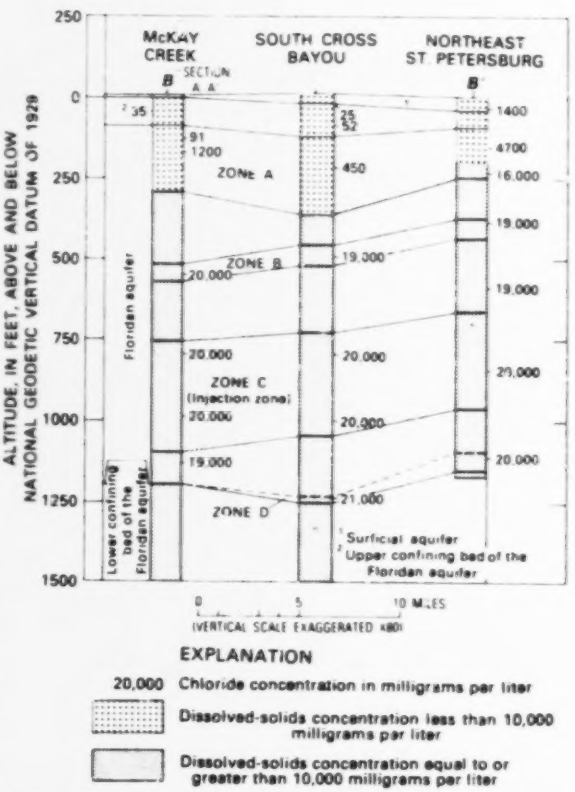

Figure 2.—Vertical section *B-B'* showing chloride and dissolved-solids concentration in ground water. (Location of section *B-B'* is shown on figure 1.)

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NATIONAL WATER CONDITIONS

October 1982

Based on reports from the Canadian and U.S. Field offices; completed November 9, 1982

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for October are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

METRIC EQUIVALENTS OF UNITS USED IN THE NATIONAL WATER CONDITIONS

1 foot = 0.3048 meter

1 acre-foot = 1,233 cubic meters

1 million cubic feet = 28,320 cubic meters

1 cubic foot per second =
0.02832 cubic meters per second =
1.699 cubic meters per minute

1 cubic foot per second · day = 2,447 cubic meters

1 mile = 1.609 kilometers

1 square mile = 259 hectares = 2.59 square kilometers

1 million gallons = 3,785 cubic meters =
3.785 million liters

1 million gallons per day = 694.4 gallons per minute =
2.629 cubic meters per minute =
3,785 cubic meters per day

(Round-number conversions, to nearest four significant figures)

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National Water Conditions

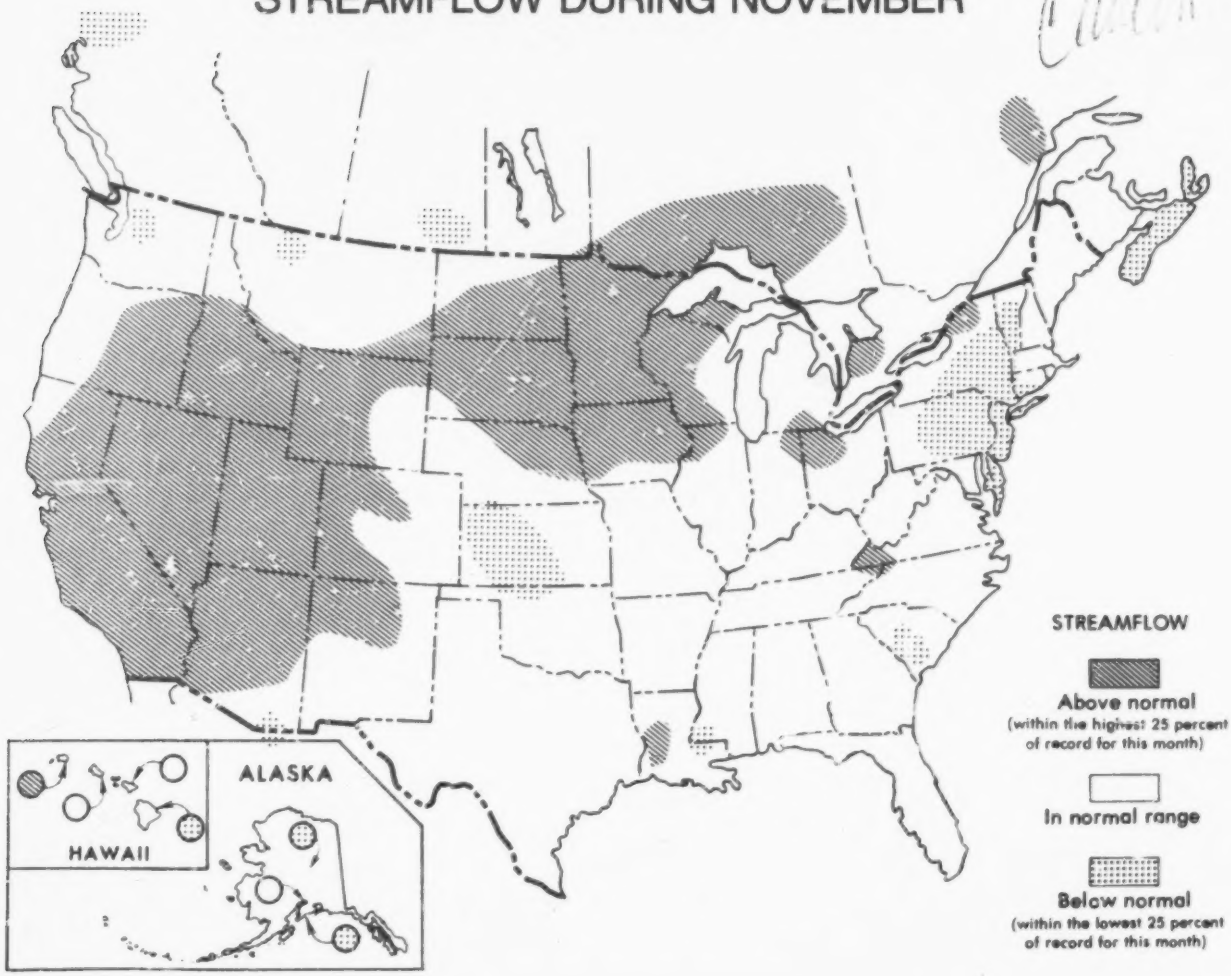
(Formerly the Water Resources Review)

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

NOVEMBER 1982

STREAMFLOW DURING NOVEMBER



Streamflow in the United States and southern Canada was generally in the normal range or above that range during November. Exceptions included a large area of below normal streamflow that centered on southeastern New York State.

Declining reservoir levels in the Delaware River basin prompted local officials to issue a drought watch in the early part of the month.

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STREAMFLOW CONDITIONS DURING NOVEMBER 1982

Streamflow increased seasonally in the Northeast, throughout most of the Ohio River basin and in Wisconsin, Alabama, Arizona, Nevada, and the Pacific Coast States. Monthly mean flows remained in the above-normal range (within the highest 25 percent of record) in a large area that extended from Ontario southwest to California, and monthly and/or daily mean discharges were highest of record for November at several locations in Iowa, Michigan, Minnesota, North Dakota, Nebraska, Nevada, and Utah. For example, the monthly mean discharge of 1,850 cubic feet per second (cfs) and the daily mean flow of 6,740 cfs at Elkhorn River at Waterloo (drainage area, 6,900 square miles) were highest for November in 62 years of record and flow at that site remained in the above-normal range for the 7th consecutive month. In southeastern Iowa, the monthly mean flow of 118,900 cfs at Mississippi River at Keokuk (drainage area, 119,000 square miles) was highest for November in 100 years, surpassed only by the monthly mean flow of 211,300 cfs that occurred at that site in November 1881. The table at the bottom of page 3 lists the new extremes established at streamflow index stations during November 1982 together with the previous maximum monthly and daily mean flows for period of record. Monthly mean discharge of Minnesota River near Jordan, Minnesota, continued to increase, was over 7 times the November median flow, and was typical of the above-normal trend in streamflow and the record or near-record high flows of November in western and north-central areas of the Nation. (See graph on page 3.)

Hurricane Iwa struck the State of Hawaii with winds up to 110 miles per hour on the afternoon of November 23. The islands of Niihau, Kauai, and parts of Oahu suffered heavy damage and were declared disaster areas by Governor Ariyoshi. Since little rain fell during the storm period, there were no reports of riverine flooding. Monthly mean flow of East Branch of North Fork Wailua River near Lihue (island of Kauai) increased seasonally to 171 percent of median and was in the abovenormal range. Flow at that site has been above median for 13 consecutive months.

By contrast, flows were in the below-normal range (within the lowest 25 percent of record) in most of New Jersey and parts of adjacent States during November, and parts of Vermont, South Carolina, Louisiana, Kansas, Arizona, Washington, Montana, British Columbia, Saskatchewan, and Nova Scotia also experienced low flows. For example, monthly mean flow of Susquehanna River at Conklin, New York increased seasonally during November, but was only 19 percent of median and remained in the below-normal range for the third consecutive month. (See graph on page 3.)

Declining reservoir levels in the Delaware River basin prompted local officials to issue a drought watch in the early part of the month. The New York City reservoir system, for example, was only 51 percent of capacity on November 29, 1982, about 30 percent below average for that date. Reservoir contents were generally near or above average elsewhere in the United States and southern Canada except for parts of Nova Scotia, Quebec, Maryland, North Carolina, and several western States. In California, for example, the combined contents of 10 index reservoirs in northern and central parts of the State decreased to 135 percent of average at month's end and were 116 percent of the contents 1 year ago.

The combined flow of three large rivers—Mississippi, St. Lawrence, and Columbia—averaged 723,600 cubic feet per second during November, up 5 percent from last month and 12 percent above the long-term median flow for the month. Because these three large rivers account for about half the runoff in the conterminous 48 States, their combined flow provides a quick, useful check on the status of the Nation's water recources.

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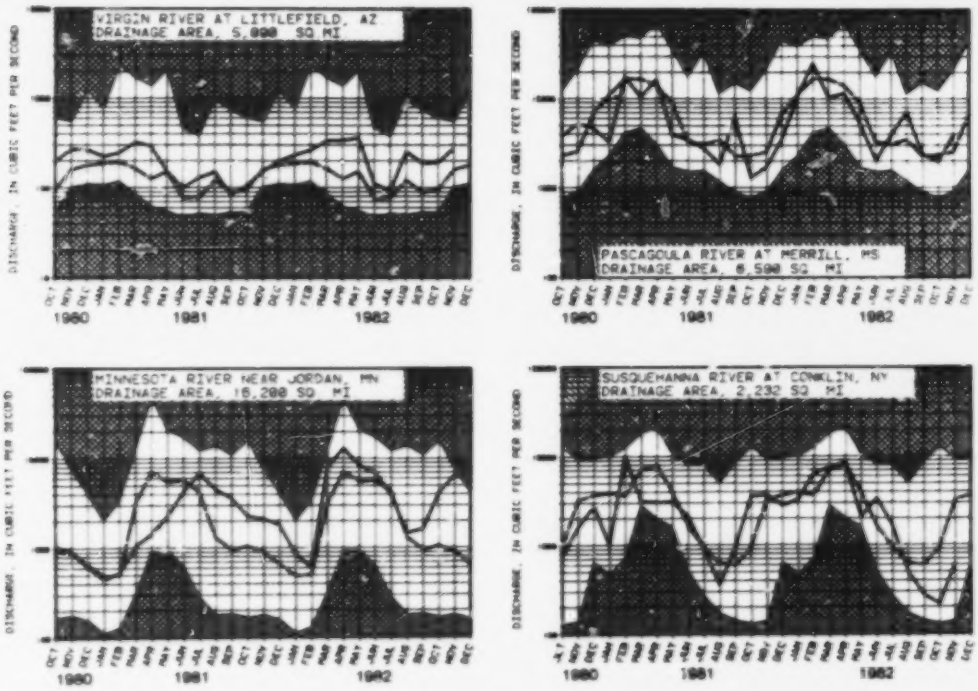
SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.



NEW EXTREMES DURING NOVEMBER 1982 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Years of record	Maximum November means (period of record)		November 1982			
				Monthly mean in cfs (year)	Daily mean in cfs (year)	Monthly mean in cfs	Percent of median	Daily mean in cfs	Day
04040500	Sturgeon River near Sidnaw, Michigan.	171	42	373 (1967)	1,030 (1979)	414	225	824	21
05362000	Jump River at Sheldon, Wisconsin.	574	67	1,726 (1939)	12,000 (1939)	1,776	660	3,661	12
05407000	Wisconsin River at Muscoda, Wisconsin.	10,300	69	15,780 (1942)	30,800 (1920)	15,840	242	33,600	17
05464500	Cedar River at Cedar Rapids, Iowa.	6,510	80	9,327 (1973)	17,400 (1910)	8,865	480	17,500	17
05480500	Des Moines at Fort Dodge, Iowa.	4,190	51	4,059 (1980)	7,430 (1974)	4,469	1,371	7,190	14
06354000	Cannonball River at Breien, North Dakota.	4,100	48	73.2 (1945)	163 (1957)	207	1,005	834	3
06800500	Elkhorn River at Waterloo, Nebraska.	6,900	62	1,450 (1952)	3,100 (1980)	1,850	314	6,740	12
09315000	Green River at Green River, Utah.	40,600	83	5,722 (1973)	8,710 (1958)	6,376	230	7,360	11
103225	Humboldt River at Palisade, Nevada.	5,010	75	189 (1942)	208 (1972)	359	544	463	3

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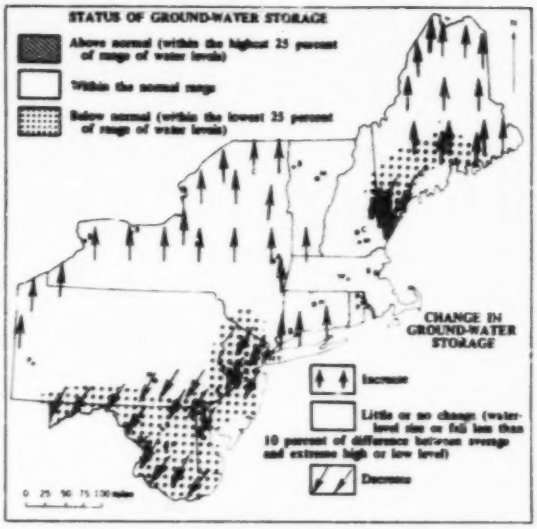
GROUND-WATER CONDITIONS DURING NOVEMBER 1982

Ground-water levels continued to decline in Maryland, Delaware, in northern and central parts of New Jersey, and in southwestern Maine. Levels rose in much of New York State and in the northern and eastern parts of Maine. Below-average levels persisted in Maryland, Delaware, and in most of New Jersey, and were below average also in much of southern Maine. Levels in two observation wells in Delaware and Maryland were lowest of record for the 20 to 30 years of measurement at those two sites.

In the southeastern States, ground-water levels rose in Alabama, rose or held steady in West Virginia and Kentucky, declined in North Carolina, and declined in much of Mississippi and Georgia; trends were generally mixed in the other States. Levels were below average in Virginia and Arkansas, above average in Kentucky, North Carolina, and Alabama, and mixed with respect to average elsewhere. Several new low levels for November occurred in Louisiana.

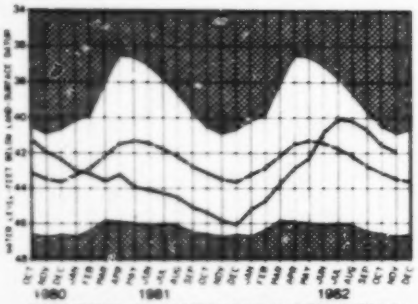
Among the Great Lakes States, including also Iowa, ground-water levels generally rose, but trends were


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Within the normal range
Below normal (within the lowest 25 percent of range of water levels)
CHANGE IN GROUND-WATER STORAGE
Increase
Little or no change (water-level rise or fall less than 10 percent of difference between average and extreme high or low level)
Decrease

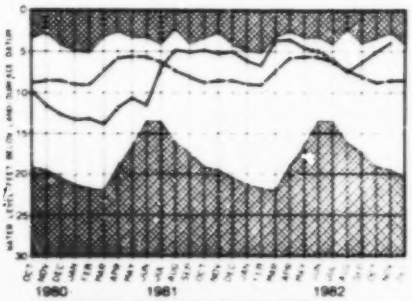
Map shows ground-water storage near end of November and change in ground-water storage from end of October to end of November.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

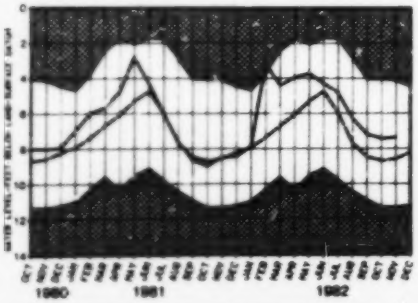
Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.



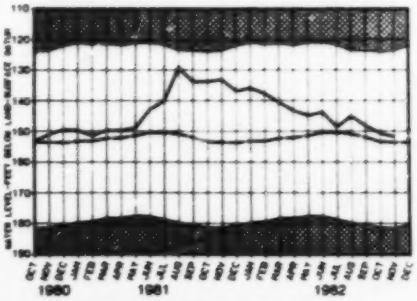
NEAR CHAPEL HILL, ORANGE COUNTY, NORTH CAROLINA
IN GRANITE
48 YEARS OF RECORD



NEAR HANSKA, BROWN COUNTY, MINNESOTA
IN GLACIAL DEPOSITS
30 YEARS OF RECORD



AT PARADISE VALLEY, HUMBOLDT COUNTY, NEVADA
IN QUATERNARY ALLUVIUM
38 YEARS OF RECORD



NEAR BUDA, TRAVIS COUNTY, TEXAS
IN EDWARDS LIMESTONE
38 YEARS OF RECORD

BEST DOCUMENT AVAILABLE

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES—NOVEMBER 1982

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year record began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota	-3.91	+1.66	+1.16	+1.37	1943	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan	-4.39	+0.54	+0.36	+0.90	1935	
Glacial drift at Marion, Iowa	-2.13	+4.68	+4.05	+1.24	1941	
Glacial drift at Princeton in northwestern Illinois	-8.48	+5.72	+3.24	+1.40	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia	-16.28	-0.03	+0.49	+1.68	1939	
Glacial outwash sand and gravel, Louisville, Kentucky	-18.79	+7.37	+0.02	-0.46	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-103.30	-15.03	+0.39	+0.24	1941	
Granite in eastern Piedmont Province, Chapel Hill, North Carolina	-41.96	+1.56	-0.40	+3.87	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-230.00	-27.51	+5.55	+13.70	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-29.3	+0.5	+1.0	+0.9	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia	-23.30	-5.22	+0.15	+1.75	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-104.28	+6.43	+0.60	+2.05	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	-458.0	+2.6	-0.6	+7.4	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	-123.2	-8.0	-0.7	+0.5	1957	
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-4.20	+2.18	-0.14	+2.90	1935	
Alluvial valley fill in Steptoe Valley, Nevada	-10.94	+2.49	+0.10	+0.48	1950	November high
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-124.86	-7.21	+0.16	+0.08	1947	
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California	-138.15	+9.07	-10.2	-5.36	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	-112.8	-35.53	+0.5	+2.9	1951	
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-59.29	-0.13	+2.74	+1.93	1966	
Hueco bolson, El Paso area, Texas	-259.81	-16.15	+0.75	-1.74	1965	November low
Evangeline aquifer, Houston area, Texas	-334.00	-33.80	-2.80	-15.87	1965	Alltime low

mixed in Iowa and Indiana. Levels were above average except in a few wells in Minnesota and Michigan, and were near average in Wisconsin.

Among the western States, ground-water levels rose in Washington and Nevada; trends were mixed in other States. Levels were above average in Washington, North Dakota, and Nebraska, and were above and below average elsewhere. A new high water level for November was recorded in Nevada, and new lows for November occurred in Idaho, Arizona, and Texas. A new alltime low was reached in the key well in the Evangeline aquifer in Houston, Texas, in 18 years of record.

BEST DOCUMENT AVAILABLE

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF NOVEMBER 1982

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Nov. 1982	End of Nov. 1981	Average for end of Nov.	End of Oct. 1982	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	28	56	40	38	[b]226,300
QUEBEC					
Allard (P)	87	92	62	83	280,600
Gouin (P)	54	65	68	49	6,954,000
MAINE					
Seven reservoir systems (MP)	56	91	57	45	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	72	69	74	67	76,450
Lake Francis (FPR)	77	79	78	71	99,310
Lake Winnipesaukee (PR)	65	88	59	66	165,700
VERMONT					
Harriman (P)	65	71	64	63	116,200
Somerset (P)	65	69	71	66	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	73	69	72	76	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	46	82	56	47	786,700
Indian Lake (FMP)	65	82	60	73	103,300
New York City reservoir system (MW)	51	61	...	59	1,680,000
NEW JERSEY					
Wanaque (M)	66	38	65	71	55,1[illegible]0
PENNSYLVANIA					
Allegheny (FPR)	58	48	33	38	1,180,000
Pymatuning (FMR)	92	95	79	87	188,000
Raystown Lake (FR)	66	66	48	66	761,900
Lake Wallenpaupack (FR)	60	43	51	63	157,800
MARYLAND					
Baltimore municipal system (M)	65	66	84	68	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	92	84	76	90	288,800
Narrows (Badin Lake) (P)	95	62	92	90	128,900
High Rock Lake (P)	42	44	55	58	234,800
SOUTH CAROLINA					
Lake Murray (P)	83	78	59	82	1,614,000
Lakes Marion and Moultrie (P)	75	78	63	83	1,862,000
SOUTH CAROLINA–GEORGIA					
Clark Hill (FP)	61	34	51	66	1,730,000
GEORGIA					
Burton (PR)	92	77	57	93	104,000
Sinclair (MPR)	91	77	72	72	214,000
Lake Sidney Lanier (FMPR)	58	28	50	58	1,686,000
ALABAMA					
Lake Martin (P)	85	80	60	88	1,373,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	34	31	31	34	2,229,300
Douglas Lake (FPR)	26	20	17	23	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	49	43	41	56	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	46	38	34	49	2,880,090
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	50	43	40	54	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	98	74	75	94	365,000
Wisconsin River (21 reservoirs) (PR)	95	52	64	95	399,000
MINNESOTA					
Mississippi River headwaters system (FMR)	30	30	27	34	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	89	76	87	92	22,700,000
SOUTH DAKOTA					
Angostura (I)	87	52	72	85	127,600
Belle Fourche (I)	79	29	39	72	185,200
Lake Francis Case (FIP)	50	49	50	68	4,834,000
Lake Oahe (FIP)	86	64	...	85	22,530,000
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	100	101	94	101	1,725,000
Lewis and Clarke Lake (FIP)	96	92	92	92	477,000
NEBRASKA					
Lake McConaughy (IP)	80	77	67	78	1,948,000
OKLAHOMA					
Eufaula (FPR)	81	104	90	78	2,378,000
Keystone (FPR)	76	95	90	74	661,000
Tenkiller Ferry (FPR)	90	106	99	88	628,200
Lake Altus (FIMR)	55	11	45	53	133,000
Lake O'The Cherokees (FPR)	82	92	82	82	1,492,000
OKLAHOMA–TEXAS					
Lake Texoma (FMPRW)	89	99	92	89	2,722,000
TEXAS					
Bridgeport (IMW)	87	100	44	91	386,400
Canyon (FMR)	93	100	74	92	385,600
International Amistad (FIMPW)	88	107	88	89	3,497,000
International Falcon (FIMPW)	74	104	79	75	2,668,000
Livingston (IMW)	100	102	81	100	1,788,000
Possum Kingdom (IMPRW)	88	93	99	90	570,200
Red Bluff (PI)	15	17	28	14	307,000
Toledo Bend (P)	86	90	79	85	4,472,000
Twin Buttes (FIM)	37	50	31	37	177,800
Lake Kemp (IMW)	81	58	86	80	268,000
Lake Meredith (FWM)	50	35	37	49	796,900
Lake Travis (FIMPRW)	77	99	78	76	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	84	88	78	93	1,052,000
Franklin D. Roosevelt Lake (IP)	93	97	100	100	5,022,000
Lake Chelan (PR)	68	73	65	81	676,100
Lake Cushman (PR)	45	88	84	64	359,500
Lake Merwin (P)	100	92	91	104	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	71	51	52	61	1,235,000
Coeur d'Alene Lake (P)	41	48	53	62	238,500
Pend Oreille Lake (FP)	52	35	49	81	1,561,000
IDAHO–WYOMING					
Upper Snake River (8 reservoirs) (MP)	74	43	55	80	4,401,000
WYOMING					
Boysen (FIP)	93	84	79	98	802,000
Buffalo Bill (IP)	93	53	71	96	421,300
Keyhole (F)	30	21	44	25	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	54	41	46	52	3,056,000
COLORADO					
John Martin (FIR)	6	5	12	4	364,400
Taylor Park (IR)	69	47	53	68	106,200
Colorado–Big Thompson project (I)	56	45	55	56	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	91	80	...	92	31,620,000
UTAH–IDAHO					
Bear Lake (IPR)	84	61	57	87	1,421,000
CALIFORNIA					
Folsom (FIP)	66	65	51	74	1,000,000
Hetch Hetchy (MP)	94	53	40	92	360,400
Isabella (FIR)	47	29	22	57	568,100
Pine Flat (FI)	72	39	40	71	1,001,000
Clair Engle Lake (Lewiston) (P)	82	76	69	84	2,438,000
Lake Almanor (P)	87	75	48	87	1,036,000
Lake Berryessa (FIMW)	90	75	74	71	1,600,000
Millerton Lake (FI)	71	41	39	68	503,200
Shasta Lake (FIPR)	76	73	64	78	4,377,000
CALIFORNIA–NEVADA					
Lake Tahoe (IPR)	85	33	45	90	744,600
NEVADA					
Rye Patch (I)	78	29	49	71	194,300
ARIZONA–NEVADA					
Lake Mead and Lake Mohave (FIMP)	90	85	69	87	27,970,000
ARIZONA					
San Carlos (IP)	8	24	14	8	1,073,000
Salt and Verde River system (IMPR)	66	54	36	65	2,073,000
NEW MEXICO					
Conchas (FIR)	72	46	80	74	330,100
Elephant Butte and Caballo (FIPR)	38	32	27	35	2,453,000

[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

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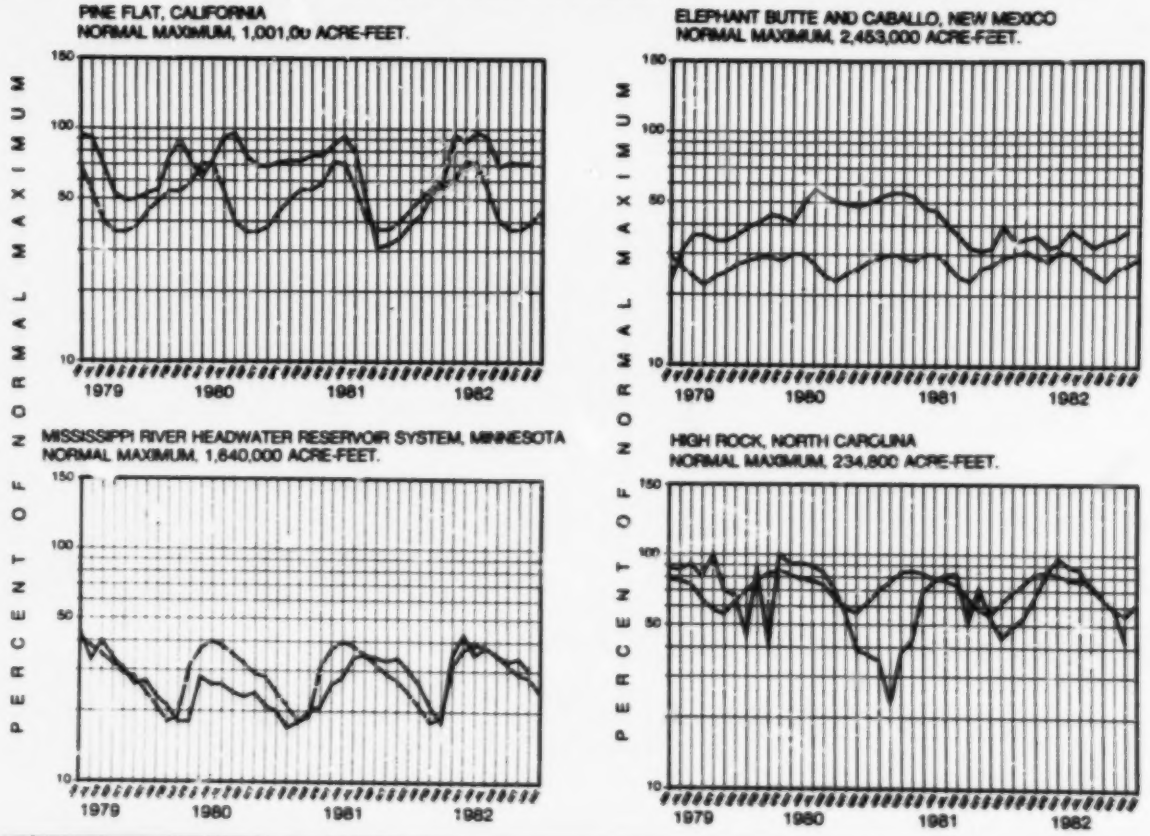
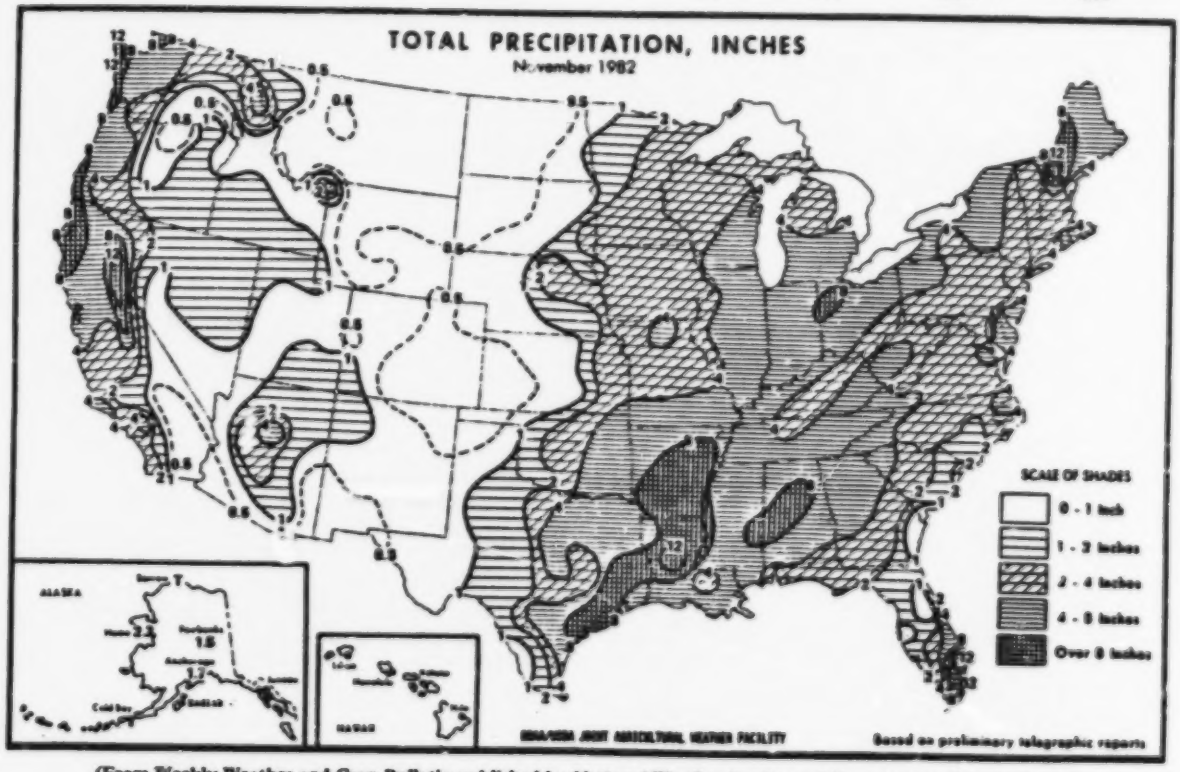
USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS JUNE 1979 TO NOVEMEBER 1982

Dashed line indicates average of month-end contents. Solid line indicates current period.





(From Weekly Weather and Crop Bulletin published by National Weather Service and Department of Agriculture.)

BEST DOCUMENT AVAILABLE

Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING NOVEMBER 982

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	November 1982					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	8,479	120	+95	7,620	4,924	30
01318500	Hudson River at Hadley, N.Y	1,664	2,909	2,520	105	+98	2,170	1,402	30
01357500	Mohawk River at Cohoes, N.Y	3,456	5,734	2,430	51	+119	4,500	2,910	30
01463500	Delaware River at Trenton, N.J	6,780	11,750	5,101	52	+22	5,510	3,561	29
01570500	Susquehanna River at Harrisburg, Pa	24,100	34,530	9,050	37	+84	17,200	11,120	30
01646500	Potomac River near Washington, D.C.	11,560	[1] 11,490	3,290	74	+28	5,910	3,819	30
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	1,500	77	-4	1,300	840	29
02131000	Pee Dee River at Peedee, S.C	8,830	9,851	5,730	126	+28	4,710	3,044	29
02226000	Altamaha River at Doctortown, Ga	13,600	13,880	4,106	82	-6	5,230	3,380	27
02320500	Suwannee River at Branford, Fla	7,880	6,987	2,830	85	-19	2,620	1,693	30
02358000	Apalachicola River at Chattahoochee, Fla	17,200	22,570	13,000	116	+3	13,900	8,980	30
02467000	Tombigbee River at Demopolis lock and dam near Costopa, Ala	15,400	23,300	6,250	99	+97	39,800	25,720	30
02489500	Pearl River near Bogalusa, La	6,630	9,768	2,462	96	-27	5,490	3,548	30
03049500	Allegheny River at Natrona, Pa	11,410	[1] 19,480	15,090	110	+236	39,000	25,200	30
03085000	Monongahela River at Braddock, Pa.	7,337	[1] 12,510	8,083	105	+96	32,200	20,810	30
03193000	Kanawha River at Kanawha Falls, W. Va	8,367	12,590	7,937	100	+48	9,030	5,836	28
03234500	Scioto River at Higby, Ohio	5,131	4,547	1,860	115	+134	6,110	3,948	30
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	57,600	92	+121	115,600	74,710	28
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	14,200	129	+62	39,800	25,720	30
03469000	French Broad River below Douglas Dam, Tenn.	4,543	6,798	5,224	111	+61	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[3]	6,150	4,163	3,273	93	+39	2,547	1,646	20
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	266,300	107	0	273,000	176,400	30
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	26,500	146	+98	17,000	11,000	30
05082500	Red River of the North at Grand Forks, N. Dak	30,100	2,551	2,800	221	-21	2,860	1,848	28
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	23,200	238	+14	28,400	18,360	25
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	6,492	722	+56	6,77.	4,375	30
05331000	Mississippi River at St. Paul, Minn	36,800	[1] 10,610	17,853	284	+2	21,300	13,770	30
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	11,550	299	+4	5,840	3,774	28
05407000	Wisconsin River at Muscoda, Wis	10,300	8,617	15,840	242	+42	.....	.....	...
05446500	Rock River near Joslin, Ill	9,551	5,873	9,110	240	+107	8,300	5,360	30
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	118,900	259	+61	116,500	75,300	30
06214500	Yellowstone River at Billings, Mont	11,796	7,038	4,289	111	-25	4,100	2,650	30
06934500	Missouri River at Hermann, Mo	524,200	79 490	82,240	150	+13	95,000	61,400	30
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	365,500	121	+12	556,000	359,400	29
07331000	Washita River near Dickson, Okla.	7,202	1,368	265	68	+5	290	187	30
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	725	692	165	-9	600	390	30
09315000	Green River at Green River, Utah.	40,600	6,298	6,376	230	-16	5,770	3,729	22
11425500	Sacramento River at Verona, Calif	21,257	18,820	25,777	198	+58	41,700	26,950	21
13269000	Snake River at Weiser, Idaho	69,200	18,050	23,000	153	+18	24,800	16,030	28
13317000	Salmon River at White Bird, Idaho	13,550	11,250	6,700	130	-11	5,250	3,393	28
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	4,690	93	-4	10,200	6,590	28
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	91,780	105	-5	126,400	81,690	28
14191000	Willamette River at Salem, Oreg.	7,280	23,510	17,940	67	+150	23,520	15,201	28
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	9,153	110	39	8,300	5,360	30
8MF005	Fraser River at Hope, British Columbia.	83,800	96,290	51,553	88	-36	30,261	19,558	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

BEST DOCUMENT AVAILABLE

Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR NOVEMBER AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	November data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean in°C	Minimum, in°C	Maximum, in°C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1982	5,100	105	115	1,510	1,000	2,390	9.5	5.0	16.5
		1945–81	10,140	55	151	.....	469	12,300	.....	2.0	19.0
		(Extreme yr)		(1955)	(1964)		(1963)	(1972)			
			[c]9,825								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena N.Y. median streamflow at Ogdensburg, N.Y.	1982	266,000	164	167	119,000	116,000	121,000	9.0	7.5	11.5
		1975–81	285,000	162	169	128,000	106,000	137,000	8.5	4.5	12.0
		(Extreme yr)		(1980)	(1977)		(1978)	(1977)			
			[c]248,300								
	SOUTHEAST										
0728900	Mississippi River at Vicksburg, Miss.	1982	365,500	249	280	261,000	196,000	390,000	12.0	9.5	16.0
		1975–81	396,600	188	297	254,000	123,000	439,000	14.0	8.0	20.0
		(Extreme yr)		(1977)	(1981)		(1976)	(1977)			
			[c]298,600								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	1982	*142,000	155	237	.....	31,800	102,000	.....	13.0	16.0
		1955–81	168,100	129	425	.....	27,200	406,000	.....	1.0	19.5
		(Extreme yr)		(1957)	(1968)		(1954)	(1957)			
			[c]147,600								
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1982	81,900	404	483	99,600	86,100	127,000	9.5	6.0	15.0
		1975–81	73,450	225	506	75,700	43,600	156,000	9.0	3.5	15.0
		(Extreme yr)		(1977)	(1980)		(1976)	(1977)			
			[c]54,680								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1982	149,000	96	111	41,600	32,200	50,500	11.0	8.0	13.0
		1975–81	127,100	38	128	34,400	10,800	66,400	11.5	6.0	14.5
		(Extreme yr)		(1980)	(1978)		(1980)	(1978)			
			[c]87,960								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X°C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.
*Maximum and minimum dissolved solids are from the first 23 days of the month with 4 intermittent days missing.

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STREAMFLOW CHARACTERISTICS RELATED TO CHANNEL GEOMETRY OF STREAMS IN WESTERN UNITED STATES

The abstract and illustrations below are from the report, *Streamflow characteristics related to channel geometry of streams in western United States*, by E. R. Hedman and W. R. Osterkamp, U.S. Geological Survey Water Supply Paper 2193, 17 pages, 1982. This report may be purchased for $3.25 from Eastern Distribution Branch, U.S. Geological Survey, 604 S. Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

Assessment of surface-mining and reclamation activities generally requires extensive hydrologic data. Adequate streamflow data from instrumented gaging stations rarely are available, and estimates of surface-water discharge based on rainfall-runoff models, drainage area, and basin characteristics sometimes have proven unreliable. Channel-geometry measurements offer an alternative method of quickly and inexpensively estimating stream-flow characteristics for ungaged streams. The method uses the empirical development of equations to yield a discharge value from channel-geometry and channel-material data. (See figure 1.) The equations are developed by collecting data at numerous streamflow-gaging sites and statistically relating those data to selected discharge characteristics.

Mean annual runoff and flood discharges with selected recurrence intervals can be estimated for perennial, intermittent, and ephemeral streams. The equations were developed from data collected in the western one-half of the conterminous United States. (See table 1.) The effect of the channel-material and runoff characteristics are accounted for with the equations.

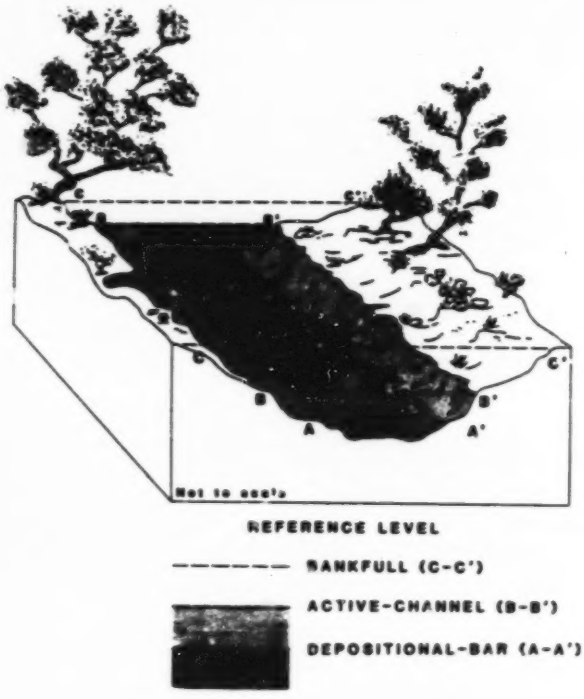

Figure 1. Commonly used reference levels.

Table 1.—*Equations for determining mean annual runoff for streams in western United States*

Flow frequency	Areas of similar regional-runoff characteristics a/	Percentage of time having discharge	Channel-material characteristics b/	Equation c/	Standard error of estimate (percent)	Equation number
Perennial	Alpine	More than 80	Silt-clay and armored	$Q_A = 64W_{AC}^{1.88}$	28	(7)
Intermittent	Plains north of latitude 39°N.	10 to 80	Silt-clay and armored	$Q_A = 40W_{AC}^{1.80}$	50d/	(8)
			Sand	$Q_A = 40W_{AC}^{1.65}$	50d/	(9)
	Plains south of latitude 39°N.	10 to 80	Silt-clay and armored	$Q_A = 20W_{AC}^{1.63}$	50d/	(10)
			Sand	$Q_A = 20W_{AC}^{1.55}$	50d/	(11)
Ephemeral	Northern and southern plains and intermontaine areas	6 to 9	Silt-clay and armored	$Q_A = 10W_{AC}^{1.56}$	e/	(12)
			Sand	$Q_A = 10W_{AC}^{1.50}$	e/	(13)
		2 to 5	Silt-clay and armored	$Q_A = 4.0W_{AC}^{1.50}$	40d/	(14)
			Sand	$Q_A = 4.0W_{AC}^{1.40}$	40d/	(15)
	Deserts of the Southwest	1 or less	Silt-clay and armored	$Q_A = 0.04W_{AC}^{1.75}$	75d/	(16)
			Sand	$Q_A = 0.04W_{AC}^{1.60}$	75d/	(17)

a/ Areas of climatic characteristics shown in figure 9.

b/ Silt-clay channels--bed material d_{50} less than 0.1 millimeter or bed material d_{50} equal to or less than 5.0 millimeters and bank silt-clay content equal to or greater than 70 percent.

Sand channels--bed material d_{50} = 0.1-5.0 millimeters and bank silt-clay content less than 70 percent.

Armored channels--bed material d_{50} greater than 5.0 millimeters.

c/ Active-channel width, W_{AC}, in feet; discharge, Q_A, in acre-feet per year.

d/ Approximate--standard error of estimate of the basic regression equation.

e/ Standard error of estimate not determined; graphical analyses.

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NATIONAL WATER CONDITIONS

November 1982

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for November are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

METRIC EQUIVALENTS OF UNITS USED IN THE NATIONAL WATER CONDITIONS

1 foot = 0.3048 meter

1 acre-foot = 1,233 cubic meters

1 million cubic feet = 28,320 cubic meters

1 cubic foot per second =
0.02832 cubic meters per second =
1.699 cubic meters per minute

1 cubic foot per second · day = 2,447 cubic meters

1 mile = 1.609 kilometers

1 square mile = 259 hectares = 2.59 square kilometers

1 million gallons = 3,785 cubic meters =
3.785 million liters

1 million gallons per day = 694.4 gallons per minute =
2.629 cubic meters per minute =
3,785 cubic meters per day

(Round-number conversions, to nearest four significant figures)

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